DigiPen

INSTITUTE OF TECHNOLOGY - SINGAPORE

CATALOG FOR THE ACADEMIC YEAR

2012-2013

Updated: February 28, 2012

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 subject to periodic review, and authorizes DigiPen Institute of Technology to offer the following degree programs:

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

Authorization by the HECB does not carry with it an endorsement by the board of the institution or its programs.

Any person desiring information about the requirements of the Act or the applicability of those requirements to the institute may contact the HECB at P.O. Box 43430, Olympia, WA 98504-3430, USA

Accreditation

DigiPen Institute of Technology, located in Redmond, Washington, is accredited by the Accrediting Commission of Career Schools and Colleges ("ACCSC", or "the Commission"), a recognized accrediting agency recognized by the United States Department of Education.

Important dates in DigiPen-Redmond's accreditation history are as follows:

2002: DigiPen was granted initial accreditation by ACCSC, including approval for the Computer Science in Real-Time Interactive Simulation (BS) degree program.

2002: DigiPen received ACCSC approval for the Production Animation (BFA) degree program.

2003: DigiPen received ACCSC approval for the Computer Engineering (BS) degree program.

2005: DigiPen was granted a renewal of accreditation by ACCSC.

2006: DigiPen was granted approval for its Master of Science in Computer Science degree program by ACCSC.

2008: DigiPen was granted approval for its Game Design (BA) and Game Design (BS) degree programs by ACCSC.

2010: DigiPen was granted approval for its relocation to its current facility by ACCSC.

2010: DigiPen received ACCSC approval, which allows DigiPen Institute of Technology Singapore to disclose in advertising that it is a branch campus of DigiPen Institute of Technology.

2011: DigiPen Institute of Technology Singapore received initial accreditation as a branch campus of the Redmond main school from ACCSC.

Registration With Council For Private Education (CPE)

DigiPen Institute of Technology Singapore is registered with the Council for Private Education (CPE).
CPE Registration No.: 200711322H
Registration Period: 21 June 2011 to 20 June 2017

DigiPen Institute of Technology Singapore will be offering the following degree programs in September 2012:

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

For a list of institutions registered with Council for Private Education (CPE) in Singapore, you may refer to the CPE website at *http://www.cpe.gov.sg/cos/o.x?c=/cpe/peis&uid=54&ptid=70&func=status&type=registered*

Collaboration with Singapore Institute of Technology

On March 9, 2010, the Ministry of Education announced that the Singapore Institute of Technology (SIT), a national institute set up to help diploma holders from the five local polytechnics obtain degrees from overseas higher education institutions, will partner with five international, highly reputable overseas higher education institutions to offer degree programs. DigiPen Institute of Technology Singapore was one of the universities invited to participate in this collaboration.

Under the collaboration, polytechnic graduates with related diplomas can apply through SIT to enroll the following degree programs at DigiPen Institute of Technology Singapore:

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

Through this admission pathway, qualified candidates who are Singaporeans and Permanent Residents may enjoy certain credit transfers, and their tuition fees will be subsidized by MOE.

About Singapore Institute of Technology

Established by MOE in 2009, SIT's mission is to provide an industry-focused university education for polytechnic graduates in partnership with the five local polytechnics and renowned overseas higher education institutions to produce highly desired graduates for growth sectors of the economy.

This tripartite partnership offers a unique model that will not only provide an additional pathway for polytechnic graduates to pursue industry-focused degree qualifications but also offer them the opportunity to pursue the same degree at a lower overall cost as compared to pursuing the same degree programs at the home campuses of the overseas higher education institutions.

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ProjectFUN® is a registered trademark of DigiPen (USA) Corp.

All other product names mentioned in this booklet are trademarks or registered trademarks of their respective companies and are hereby acknowledged.

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.

Students' information and records, including but not limited to academic, disciplinary and financial information, will be shared with SIT on a regular basis.

DigiPen Institute of Technology Singapore, 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 Singapore 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 Registrar's Office. Current major and degree requirements may also be obtained from the Registrar's Office. For the most current information, visit the Institute's official course catalog online at *singapore.digipen.edu*.

*Please note that when "Institute" is used in this book, it means "DigiPen Institute of Technology Singapore"

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RULES AND POLICIES FOR THE ACADEMIC YEAR

2012-2013

General Information

Name of the School (Branch Campus)
DigiPen Institute of Technology Singapore

Contact Information
DigiPen Institute of Technology Singapore
10 Central Exchange Green, #01-01
Singapore 138649

Telephone: +65 6577 1900
Facsimile: +65 6577 1908

Email: *singapore@digipen.edu*
Web: *singapore.digipen.edu*

Name of the School (Main School)
DigiPen Institute of Technology

Contact Information
DigiPen Institute of Technology
9931 Willows Road NE
Redmond, Washington 98052
USA

Telephone: 1 425 558 0299
Facsimile: 1 425 558 0378
Web: *www.digipen.edu*

Degree Authorization
DigiPen Institute of Technology Singapore has been permitted by the Ministry of Education, Singapore, to establish its presence in Singapore as a foreign specialized institution with effect from January 2006. The Institute will offer the following degree programs during the 2012-2013 academic year:

- **Bachelor of Science in Computer Science in Real-Time Interactive Simulation**
- **Bachelor of Science in Game Design**
- **Bachelor of Fine Arts in Digital Art and Animation**
- **(formerly Production Animation)**
- **Bachelor of Arts in Game Design**

History of DigiPen Institute of Technology
DigiPen was founded in 1988 by Mr. Claude Comair as a computer simulation and animation company based in Vancouver, British Columbia, Canada. As the demand for production work increased, DigiPen faced difficulty finding qualified personnel, and in 1990, it began offering a dedicated training program in 3D computer animation to meet this growing need.

That same year, DigiPen approached Nintendo of America to jointly establish a post-secondary program in video game programming. The result of this collaborative effort was the DigiPen Applied Computer Graphics School, which in 1994 officially accepted its first class of video game programming students to its Vancouver campus for the two-year Diploma in the Art and Science of 2D and 3D Video Game Programming. In 1995, DigiPen implemented a revised two-year 3D computer animation program and graduated student cohorts over each of the following four years.

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 these worlds became more sophisticated, so did the task of programming, designing, and animating them. In anticipation of this change, DigiPen developed a four-year bachelor's degree in video game programming (the Bachelor of Science in Computer Science in Real-Time Interactive Simulation) that would prepare students for the challenges of creating complex 3D game and simulation software.

In 1996, the Washington State Higher Education Coordinating Board (HECB) granted DigiPen the authorization to award both Associate and Bachelor of Science degrees in Real-Time Interactive Simulation. Two years later, in 1998, DigiPen Institute of Technology opened its campus in Redmond, Washington, USA. In 1999, DigiPen began offering the Associate of Applied Arts in 3D Computer Animation. At this time, DigiPen phased out its educational activities in Canada, moving all operations to its Redmond campus. On July 22, 2000, DigiPen held its first commencement ceremony, where it awarded Associate of Science and Bachelor of Science degrees.

In 2002, DigiPen received accreditation from the Accrediting Commission of Career Schools and Colleges (ACCSC). In 2004, DigiPen began offering three new degrees: the Bachelor of Science in Computer Engineering, the Master of Science in Computer Science*, and the Bachelor of Fine Arts in Digital Art and Animation. In 2008, DigiPen added two more degree programs: the Bachelor of Science in Game Design and the Bachelor of Arts in Game Design.

Also in 2008, DigiPen partnered with Singapore's Economic Development Board to open its first international branch campus, offering the following degrees**: the Bachelor of Science in Computer Science in Real-Time Interactive Simulation, the Bachelor of Science in Game Design, the Bachelor of Fine Arts in Digital Art and Animation, and the Bachelor of Arts in Game Design. On October 11, 2011, DigiPen Institute of Technology Singapore was granted accreditation by ACCSC as a branch campus of the main school located in Redmond, Washington, USA. In 2010, DigiPen announced plans to open its first European campus in Bilbao, Spain, in partnership with the Bilbao Chamber of Commerce.

That same year, DigiPen relocated its US campus to its current location at 9931 Willows Road Northeast in Redmond, Washington. In addition to uniting DigiPen's BFA and BS programs under one roof, the larger campus provides more spaces for students to learn, meet, and collaborate, on group projects.

*ACCSC granted approval for this degree in 2006.

**DigiPen's International branch campus (Europe-Bilbao) does not fall within the scope of ACCSC accreditation.

Awards
DigiPen students have consistently excelled in both national and international video game competitions. At the prestigious annual Independent Games Festival (IGF) in San Francisco, California, DigiPen games have been nominated to the Student Showcase for the last 11 consecutive years. Out of 105 games recognized by the IGF as Student Showcase winners since 2001, 24 were created by DigiPen students – considerably more than that of any other school. In 2007, 2008, and 2009, DigiPen students also won the coveted Best Student Game award (for *Toblo, Synaesthete*, and *Tag: The Power of Paint*, respectively). In the IGF Main Competition division, five DigiPen student games have been nominated for awards in various professional categories over the years with *Bontago* winning the highly sought after "Innovation in Game Design" award in 2004. In 2011, the Independent Games Festival China, part of the annual Game Developers Conference China, selected

three DigiPen showcase winners for its annual Student Competition which honors six of the top regional student games. The DigiPen Singapore game *Pixi* went on to attain the "Excellent Student Winner" award while *Void* won the IGF "Best Student Game" and also took the distinguished "Excellence in Technology" award in IGF China's Main Competition, the competing category for professional game developers.

Other competition highlights for DigiPen students include five finalist positions at the Slamdance Guerilla Gamemaker Competition with two of those games winning their award categories, posting wins at the Northwest Games Festival, the Intel Games Demo, the IndieCade International Festival of Independent Games, PAX 10, as well as the Indie Game Challenge, which in 2010 awarded the $100,000 nonprofessional Grand Prize to the DigiPen student game *Gear*. In 2011 at the Tokyo Game Show, only two of the ten games showcased at the annual Sense of Wonder Night were from North America with one of those, *Solstice*, being a DigiPen student production.

In addition, DigiPen students have won numerous awards at the Austin Game Developers Conference in Game Narrative Reviews and Poster Competitions.

Continuing Education Program
DigiPen Institute of Technology Singapore is a Continuing Education & Training (CET) Center appointed by the Workforce Development Agency of Singapore (WDA) for delivering Workforce Skills Qualifications (WSQ) accredited training programs in game development. With tuition fees subsidized by the WDA under the WSQ framework Skills, these CET programs are for those individuals interested in exploring the world of digital interactive entertainment production as well as those who are looking to enhance their overall knowledge in game development topics such as programming in C++, computer graphics, game engine design and artificial intelligence. The programs are cross-disciplinary with the unique characteristic of integrating coursework in computer science, computer engineering, mathematics, art and game design with game development projects.

Programs offered:

- WSQ Advanced Certificate in Games Development

- DigiPen®-Ubisoft® Campus

- Modular courses

For more information about the programs, visit *http:// singapore.digipen.edu/continuing-education*

DigiPen Institute of Technology Outreach
In addition to its post-secondary degree programs, DigiPen Institute of Technology, offers opportunities for primary, secondary, junior colleges and polytechnic students to learn about the process of video game and 3D animation production. Now branded as part of DigiPen Institute of Technology's ProjectFUN Initiative, DigiPen Institute of Technology 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, while enhancing their academic and critical thinking skills. These workshops are taught at DigiPen's USA, and Singapore campuses during the summer and are also offered in various states across the USA, as well as in Canada, Jamaica, New Zealand and Norway

ProjectFUN Technology Academies
In 2000, DigiPen began teaching a computer science program in the USA 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 in 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 teaching workshops 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
Our mission is 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 industries. 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 Singapore is committed to maintaining a diverse community in an atmosphere of mutual respect and appreciation of differences. DigiPen Institute of Technology Singapore 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 Computer Science in Real-Time Interactive Simulation**
- **Bachelor of Science in Game Design**
- **Bachelor of Fine Arts in Digital Art and Animation**
- **Bachelor of Arts in Game Design**

About DigiPen Institute of Technology Singapore's Facilities and Equipment
DigiPen Institute of Technology Singapore encompasses over 1,900 square meters with a library, dedicated computer labs for students, and classrooms for lectures and instruction. The classrooms vary in size from lecture halls accommodating up to 140 students to small classrooms of 15 students. The labs also vary in

size from those accommodating 64 students to smaller ones seating 14 students. The Institute also has an open computer lab that seats approximately 46 students.

Weekly student access to the Institute is from 8:30 A.M. to 11:00 P.M., Monday through Saturday, and from 12:00 P.M. to 11:00 P.M. on Sunday. 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 PC workstations ranging from Core 2 Duo - 3GHz processors and 2GB RAM to Xeon processors with 4GB RAM and Quadro FX graphics cards, along with industry software for 2D and 3D animation production, and development tools for game engine creation. Various presentation formats are also available, including DVD players, VCRs, document cameras, and CD players. All computers are on an internal network and have access to printers, servers, and archival media. The Institute upgrades the computer equipment on a periodic basis and as our student body grows larger each year, the Institute will acquire additional equipment to accommodate the new student population.

Description of the Library Facilities and Internet Access
Library Services
DigiPen Institute of Technology Singapore'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 Institute 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 2012 - 2013

Institutional Calendar

Fall 2012

July 27, 2012	Last day to submit Request for Change of Major for Fall 2012 Semester	
August 30-31, 2012	Orientation - First Year Students	
September 3, 2012	Fall Semester - Classes Begin	
September 10, 2012	Last day to add classes for Fall Semester	
September 14, 2012	Final day to drop classes without academic penalty	
October 24, 2012	Final day to receive 'W' on transcript for Fall Semester withdrawals . Withdrawals from the Institute after this date will receive 'F' grades on transcript. Final day to drop a class.	
October 26, 2012	Hari Raya Haji Observed*	No Classes
November 1-30, 2012	Registration Period for Spring 2013	
November 13, 2012	Deepavali Observed*	No Classes
November 26, 2012	Last day to submit Change of Major Requests for Spring 2013	
December 10-14, 2012	Fall Semester Final Exams	
December 14, 2012	Fall Semester Ends	
December 14, 2012 - January 6, 2013	Winter Break	No Classes
January 2-6, 2013	Intersession	No Classes

Spring 2013

January 7, 2013	Spring Semester - Classes Begin	
January 14, 2013	Last day to add classes for Spring Semester	
January 18, 2013	Final day to drop class without academic penalty	
February 3, 2013	Founder's Day	No Classes
February 10-11, 2013	Chinese New Year Observed*	No Classes
February 27, 2013	Final day to receive 'W' on transcript for Spring Semester withdrawals. Withdrawals from the Institute after this date will receive 'F' grades on transcript. Final day to drop a class.	

March 1-30, 2013	Registration Period for Summer 2013	
TBA	Spring Break	No Classes
March 29, 2013	Good Friday Observed*	No Classes
April 8, 2013	Last day to submit Change of Major Requests for Summer 2013	
April 22-26, 2013	Spring Semester Final Exams	
April 26, 2013	Spring Semester Ends	
April 27-May 5, 2013	Intersession	No Classes

Summer 2013

May 6, 2013	Summer Session - Classes Begin	
May 13, 2013	Last day to add classes for Summer Semester	
May 17, 2013	Final day to drop class without academic penalty	
May 25, 2013	Vesak Day Observed*	No Classes
June 1-August 1, 2013	Registration Period for Fall 2013	
June 26, 2013	Final day to receive 'W' on transcript for Summer Semester withdrawals. Withdrawals from the Institute after this date will receive 'F' grades on transcript. Final day to drop a class.	
July 25, 2013	Last day to submit Change of Major Requests for Fall 2013	
August 8, 2013	Hari Raya Puasa Observed*	No Classes
August 9, 2013	National Day Observed*	No Classes
August 12-16, 2013	Summer Session Final Exam	
August 16, 2013	Summer Session Ends	

Singapore Public Holiday

The Institute is closed on all public holidays. If a public holiday falls on a Sunday, the following day will be a public holiday in Singapore. Singapore public holidays that fall during normal intersessions (i.e. Christmas Day) have not been listed. 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, usually during the last two working days of the month unless otherwise posted.

Deadlines**

Fall 2012

July 1, 2012	Tuition deposit deadline for Fall 2012	
August 1, 2012	Tuition balance due for Fall 2012	
September 2, 2012	Last day to drop Fall courses for 100% refund	
September 9, 2012	Withdrawal deadline for 90% refund	
September 29, 2012	Withdrawal deadline for 75% refund	
October 1, 2012	Tuition deposit deadline for Spring 2013	
October 24, 2012	Withdrawal deadline for 50% refund	
December 1, 2012	Tuition balance due for Spring 2013	

Spring 2013

January 6, 2013	Last day to drop Spring courses for 100% refund	
January 13, 2013	Withdrawal deadline for 90% refund	
February 2, 2013	Withdrawal deadline for 75% refund	
February 27, 2013	Withdrawal deadline for 50% refund	
April 1, 2013	Tuition balance due for Summer 2013	

Summer 2013

May 5, 2013	Last day to drop Summer courses for 100% refund	
May 12, 2013	Withdrawal deadline for 90% refund	
June 1, 2013	Withdrawal deadline for 75% refund	
June 26, 2013	Withdrawal deadline for 50% refund	
July 1, 2013	Tuition deposit deadline for Fall 2013	
August 1, 2013	Tuition deposit due for Fall 2013	

** The deadlines mentioned above are applicable to NON-SIT students only.

Tuition and Fees

Tuition, Miscellaneous and Incidental fees

All tuition, miscellaneous and incidental fees are collected by SIT. For the most updated information, please refer to the SIT's website at *www.singaporetech.edu.sg*, SIT student handbook or contact SIT's Admissions department.

Books and Supplies

Textbooks and supplies are estimated to be approximately S$1,500.00 (plus 7% GST) per year. This cost is not included as part of the tuition.

Cancellation and Refund Policies 2012-2013

Cancellation and refund policies are determined and administered by SIT.

SIT's policy on refund of tuition fees is currently as follows:

- Students who withdraw before their matriculation date will receive a full refund less S$100.00 administrative fee;

- Students who choose to withdraw between their matriculation date and the start of their program will receive a refund of 50% of the tuition fee less S$100.00 administrative fee;

- No refund will be given for withdrawal after commencement of the program.

For more information, please refer to SIT's website at *www.singaporetech.edu.sg*, SIT's student handbook or contact SIT's Admissions department.

Financial Assistance*

MDA Media Education Scheme

(For Singaporean citizens and Permanent Residents only)

Singapore's Media Development Authority (MDA) offers a yearly scholarship for students pursuing higher education in media industry-related fields. For more details and to apply for the scholarship, please contact the MDA directly: *www.mda.gov.sg*.

Education Loans

(For Singaporean citizens and Permanent Residents only)

Students enrolled at DigiPen Institute of Technology Singapore are eligible to apply for low-interest educational loans offered through various banking institutions.

For more information, please visit *https://singapore.digipen.edu/admissions/tuition-fees/financial-assistance*.

For more information about financial aid and scholarships offered by SIT, please visit *www.singaporetech.edu.sg* or contact SIT's Admissions department.

*Financial assistance and scholarships are available to those who qualify.

Applying to DigiPen Institute of Technology Singapore

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

Visitors interested in learning about the Institute'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.sg@digipen.edu*.

One of the best ways to find out what the Institute is like as a student is to spend a day on campus, attending classes and meeting students, faculty, and staff. Throughout the year, the Admissions department can help prospective students arrange to shadow a current student. Most visitors will combine a student shadow with a one-on-one Admissions meeting. Student shadow requests should be made at least one week in advance. To learn more about this program and to schedule a time for your visit, please contact the Office of Admissions.

Undergraduate Application Process
The admission process is administered by SIT and involves the following steps:

1. Applicant applies and submits online application through SIT's application portal

2. The application received at SIT goes through centralized processing. Shortlist students for interviews

3. Applicants are shortlisted for interviews.

4. All applicants are notified about their application status via email or through SIT's onlince application system.

5. Successful applicants can accept offer at Joint Acceptance Platform or by completing an acceptance form (as stipulated in the e-offer letter).

6. Applicants who accepted offer will receive a pre-matriculation package via email.

7. Successful applicants will need to complete the pre-matriculation procedure by stipulated deadline.

8. Successful applicants will then matriculate to SIT and collect the SIT Matriculation card.

For more information about the admission process, please visit *www.singaporetech.edu.sg*

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

1. All application forms: Must be submitted online through SIT's admission portal at *www.singaporetech.edu.sg*.

2. An application fee of $15 (includes GST) will be payable to SIT. Payments can be using one of the following methods:

   • Cheque / Bank draft / Money order / Cashier's order made payable to "Singapore Institute of Technology"

     Please indicate your Name, IC No. and application number at the back of the cheque.

     You will need to mail the cheque/ money order / cashier order/ bank draft to:

     Singapore Institute of Technology
     EFG Bank Building
     25 North Bridge Road, #02-00
     Singapore 179104
     (Finance Department)

   • NETs through the Admissions Office at 25 North Bridge Road, #02-00, EFG Bank Building.

   • Internet Banking Payment for DBS/POSB customers.

   • Online payment via eNETs.

3. Official transcripts or certified true copies: Documents should be certified by an official school representative or other authorized notary and sent directly to the Institute by the school or notary in a sealed envelope. Transcripts issued in a language other than English must be accompanied by literal translations completed by a recognized translating organization.

4. Personal statement: To be completed within SIT's online application portal

5. Letters of recommendation (Optional): Two letters of recommendation from individuals familiar with

your academic background and/or work ethic, i.e. instructor, guidance counselor, employer. Recommendation letters from family members will not be considered.

6. Official scores for the Test of English as a Foreign Language (TOEFL): This score is needed if English is not the Applicant's first language. This requirement can be waived if the Applicant has proof of completing at least four years of his or her most recent education at an institution in which English is the primary language of instruction. The Institute's TOEFL code is: 1493. Please see the section on Proof of Proficiency in the English Language for additional information.

7. Other official documentation (when applicable): This includes, but is not limited to, SAT scores, proof of legal permanent residency in Singapore, certified transcripts from all institutions of tertiary education (e.g., university transcripts), proof of citizenship in Singapore (e.g. NRIC, passport, etc.) and photocopies of the personal particulars.

8. Official scores for the SAT 1 (recommended for Bachelor of Science in Computer Science in Real-Time Interactive Simulation and BSGD applicants only): The Institute's SAT code: 5473. Applicants who fail to register for SAT 1 may be required to sit for a written Math Assessment conducted by the Institute. Please see the Math & Science Requirements & Recommendations for Bachelor of Science Applicants section for details.

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

10. Personal Game History: This is only required of applicants to the Game Design (BA or BS) programs. Please see the Personal Game History section for more details.

11. Character analysis. This is only required of applicants to the Game Design (BA or BS) programs. Please see the Character or World Analysis section for more details.

12. Card or Dice Game: This is only required of applicants to the Game Design (BA or BS) programs. Please see the Character or World Analysis section for more details.

13. Optional application components for Game Design applicants:

    ▪ BAGD applicants: art portfolio or sketches of level designs.

    ▪ BSGD applicants: sketches of level designs, photos of landscapes and urban environments that inspire you, drawings or sketches made by the applicant.

Applicants should not submit electronic games or modifications as the Office of Admissions will not install any of these.

Proof of Proficiency in the English Language
Non-native English speakers must provide proof of English proficiency in one of the following ways:

• A minimum Test of English as a Foreign Language (TOEFL) score of 550 (paper exam), 213 (computer exam), or 80 (IBT - Internet-Based Test). TOEFL code: 1493

• A minimum International English Language Testing System (IELTS) score of 6.5 or higher

• Completion of four years of high school at an English-speaking school, or an International School where the primary language of instruction is English.

• Completion of a bachelor's degree at an English-speaking institution.

• The Institute may accept other proof of English proficiency, such as internationally recognized standardized English test scores, the completion of English preparatory coursework, or internal English assessments on a case-by-case basis

• The Institute may use its discretion and own internal assessments in determining sufficient English proficiency for students transferring from one DigiPen campus or program to another.

**Math & Science Requirements &
Recommendations for Bachelor of Science Applicants**

In addition to the requirements listed for all undergraduate applicants, those applying to any of the Bachelor of Science programs (Computer Science in Real-Time Interactive Simulation or BSGD) must have completed grade 12 or the equivalent with a recommended "B" average (3.0 GPA) in mathematics. Applicants to any of the Institute's Bachelor of Science programs must demonstrate (through grades, SAT exam results, and coursework) sufficient knowledge of various topics in mathematics and have completed coursework in Algebra, Geometry and Pre-Calculus at a minimum before being able to matriculate into the degree program.

Additionally, applicants to the Bachelor of Science programs are encouraged, but not required, to take Calculus, Physics and Computer Science before coming to the Institute.

Math Assessment (required for applicants who are unable to sit for SAT 1)

At its discretion, the Institute may utilize a Math Assessment to assist in determining an applicant's knowledge in algebra, geometry, and trigonometry. Based on the result of the Math Assessment, an applicant may be required to successfully complete remedial mathematics courses taught at the Institute prior to starting a degree program, provided that the applicant meets all other minimum academic and admissions requirements.

Portfolio

The Institute's intent in reviewing applicants' portfolios is to ensure that students have appropriate foundational skills relative to the degree programs to which they are applying.

Portfolio Requirements for BFA Applicants

Applicants to the Digital Art and Animation (BFA) degree program must submit an art portfolio. This portfolio should contain between 15-20 samples of original artwork by the applicant for review. At least ten pieces of the portfolio must be drawings from direct observation; they may not be from photos or other 2D reference or from the student's imagination. The rest of the pieces beyond the first ten drawings should demonstrate an applicant's artistic range and skill. Samples of animation, figure/animal studies, character designs, architectural renderings, landscape studies, sculpture,

and painting are preferred for this part of the portfolio. If necessary, the Institute may request more samples for review. The portfolio should demonstrate the following:

1. The applicant has adequate foundational drawing skills to handle the rigors of the curriculum. The portfolio should include at least ten drawings directly from live observations, preferably of people and animals (not from an applicant's imagination or from 2D references such as a photograph or another artist's work). The drawings should clearly communicate the structure and 3D form of the subject. The emphasis should be on representational accuracy rather than on cartooning or heavy stylization.

2. The applicant is a serious amateur artist. The portfolio should include five to ten samples of the applicant's best work regardless of subject matter or medium. This work should be selected with an eye toward quality, design, composition, and a dedication to craft.

Guidelines for All Portfolio Submissions

Please keep the following in mind when submitting your portfolio:

- Applicants should label portfolios clearly with their name on the front.

- All artwork should be labeled with the date of completion and medium used.

- Color copies, photocopies, slides, photographs, or work contained on CDs will be accepted, since portfolios will NOT be returned.

- Applicants who submit hard copies of artwork should contain their portfolios in A4 size binders.

**Personal Game History for
Applicants to Game Design Programs**

Applicants to either the BAGD or BSGD programs are required to submit a Personal Game History with their application. For this application component, list all the games your have ever played. Start with video games and list all the ones you can remember. Follow that with a list of all the non-video games you have ever played. List everything you can think of, whether you liked those games or not (it is okay if the list is very long). Finally, list the names of any original games you have created yourself (of any kind). In parenthesis after each game listed, write a short description of what you

have done with that game (played it a little, played it a lot, played it professionally, made modifications to it, made levels for it, etc.). For any games you created, describe the type of game and the most interesting thing about it.

Below is a sample of the required format, with some sample games and comments listed. Follow this format exactly (including the headers, capitalization, parenthesis, etc.).

VIDEO GAMES
Halo (Played it a lot.)
Doom (Played it a lot, made levels for it.)
Farmville (Played it a little.)

NON-VIDEO GAMES
Dungeons and Dragons (Played it a lot, created new classes, ran several campaigns.)
Spades (Played it a lot.)
Chess (Played it a little.)

ORIGINAL GAMES
Rhino Wars (A simple animal-based trading card game I made for my friends.)

Character Analysis for Game Design Applicants

Applicants to either the BAGD or BSGD programs are required to submit a Character Analysis essay with their application. For this application component, please go to *http://singapore. digipen.edu/admissions/ admission-requirements/ba-ingame-design/#c6265* where you will find several images of different characters. You are to select one of these character to analyze. After you have viewed the picture, please write a two-page essay about this image. You must create a background story for the character. For example, you might explain how this character became a warrior or a scientist or whatever profession you see it doing. What led the character to select this profession? How do others react to the character? Additionally, you will need to provide a complete and concise overview of the character, including the following items:

- Name, home (or culture), and class/status.

- Characteristics, skills, talents, or powers.

- Type of game (strategy, first-person shooter, arcade, etc.) you see them in.

- Character motivation: what pushes them on a challenge or adventure?

- Fighting style, if any.

- Other relevant attributes.

BAGD or BSGD applicants are being asked to do this so that we may evaluate their ability to think creatively and to communicate their ideas. Please keep in mind that this should be written as an essay rather than simply a list of details. Be sure to explain how details in the image led you to make your conclusions about the character. For the Character Analysis, you may expand on the items listed above; at a minimum, however, you must address those listed. Additional instructions about the Character Analysis essays may be posted along with the images from which they are selected and analyzed.

Card or Dice Game for Game Design Applicants

Applicants to either the BAGD or BSGD programs are required to submit a Card or Dice Game written as an essay with their application.

The rules for this game must use only normal six-sided dice and/or a normal deck of traditional playing cards – no other physical components are allowed (other than scratch paper for keeping score, if needed). Do not send dice or cards with your application, we will use our own when evaluating your game.

After creating these rules, you must test your game with other players (more than once) and describe the results in detail (including whether the results were good, bad, or mixed). The rules themselves should be at least one-third and at most two-thirds of this submission, with the rest being the play- testing description (which must come after the rules).

The rules should, of course, be updated based on the results of your play- testing. The total length must be between 800 and 1200 words. The rules and play-testing description must be clear and well-organized, using excellent grammar, and have perfect spelling.

Admission/Denial to DigiPen Institute of Technology Singapore's Programs

DigiPen Institute of Technology Singapore 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 undergraduate applicants will receive an enrollment packet via standard mail. This packet includes a student enrollment agreement, information on financial assistance, student affairs information, and, if applicable, a request to furnish proof of high school graduation, polytechnic diploma or completion of a bachelor's degree 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 rejection by mail. When possible, the Institute 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 the Reapplication Process 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 (e.g. 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 through the SIT application portal at *www.singaporetech.edu.sg*.

Readmission Information

Any student who wishes to return to the Institute after an absence may apply to do so by contacting SIT's admission team. SIT or the Institute may require certified true copies of transcripts from all institutions attended since last attending the Institute 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 SIT and the Institute.

Transcripts of Non-DigiPen Institute of Technology Singapore Coursework

If you have taken courses at another college after leaving the Institute, you must have an official transcript or certified true copies, 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

Non-Matriculated Studies

Applicants who are interested in taking individual courses that are part of the Institute's degree programs may register for them based on each semester's course offerings and availability. Applicants will be handled on a first-come, first-served basis.

1. Applicants to the Non-Matriculated Studies program must show proof of graduation from high school and a minimum 2.5 GPA in their most recent studies for acceptance into the program.

2. Upon application, a degree program track must be selected.

    ▪ To follow a Bachelor of Science track, applicants must show a "B" average in math and having completed coursework through a minimum of Pre-Calculus.

    ▪ To follow a Bachelor of Arts or Bachelor of Fine Arts track, applicants must submit an art portfolio.

3. Students must pass or show proof of having passed prerequisite courses before they are able to register for more advanced courses. Waiver exams may be administered if the student feels he or she has achieved proficiency.

4. Students must earn a "C-" or better to pass courses that are core to their chosen track.

5. Students must maintain a minimum 2.0 GPA in order to remain enrolled in the Non-Matriculated Studies program. Enrollment is on a continuous basis unless students do not register for classes for a given semester.

Please note that courses taken in the Non-Matriculated Studies program do not lead to a degree and are not applicable to earning a professional certificate from the Institute.

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 Singapore. Credit may be granted through other means: Advanced Placement (AP) Exam scores, International Baccalaureate (IB) 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 the Institute. Course transfers and waivers are processed at S$42.80 (inclusive of 7% GST) 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 at the Institute, 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 request to the Registrar's Office.

Waiver requests may be completed online through the Student Record System (SRS). 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 Registrar's Office 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 test, 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's 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 the Institute'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 the Institute.

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. The Institute 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 Registrar's Office. 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. The Institute 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 10 years may be transferred, provided such credit meets the guidelines used by the Institute. The Registrar will evaluate college credits earned elsewhere with respect to graduation requirements at the Institute. 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 courses(s) offered for transfer must be taken at a bona fide, legitimate institution recognized and approved by a regulatory authority which oversees the educational system in the country where the institution is located. These courses must appear on official transcripts from the institution. The final decision regarding the transferability of credits remains at the Institute's discretion.

2. The course(s) must be comparable in academic quality to the Institute 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 Institute grade point average. However, grades transferred for courses taken in residence at institutions with which the Institute has direct, formal institutional exchange agreements are exempt from this policy and will be recorded. Credit hours from another institution that are accepted towards the student's educational program must count as both attempted and completed hours. Courses transferred in may not be used to substitute improved grades for passing grades earned at the Institute.

Standards of Progress

Articulation Agreements

Credits from a college with an articulation agreement with the Institute will be accepted, and grades earned will be included in students' Institute 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 the Institute 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 the Institute credits.

Granting Credits for Work Experience

The Institute does not grant credit for work experience.

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. 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 courses
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.

Assessment Process
The Institute has an assessment process to evaluate the defined student learning outcomes of the education and training and established competencies. This process includes a combination of methods such as grading, portfolio assessment, projects, externships, and criterion referenced testing based on developed and appropriate rubrics.

The Institute requires that each course syllabus contain clearly defined course objectives and learning outcomes, course requirements, grading policy and allotment, and grading distribution. Students are made aware of the grading policy, performance standards, and grading distribution at the beginning of each course. The faculty measures the student's achievement of the stated course objectives and learning outcomes based on the grading policy published in the course syllabus.

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 the Institute. 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 102	4	A	16.0 (4 x 4.0)
MAT 103	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-ma-

jor 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 - 77 attempted credits for BS in Computer Science in Real-Time Interactive Simulation - 77 attempted credits for BS in GD - 72 attempted credits for BFA in DAA. - 73 attempted credits for BA in GD*	1.8 or better cumulative GPA
Over 50% of program - 78-153 attempted credits for BS in Computer Science in Real-Time Interactive Simulation - 78-153 attempted credits for BS in GD - 73-143 attempted credits for BFA in DAA. - 74-146 attempted credits for BA in GD*	2.0 or better cumulative GPA

100% of program - 154 attempted credits for BS in Computer Science in Real-Time Interactive Simulation - 154 attempted credits for BS in GD - 144 attempted credits for BFA in DAA. - 147 attempted credits for BA in GD*	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 Student Relations Department for action and resolution.

Passing Classes and Graduation
All students must have a cumulative GPA of at least 2.0 to graduate.

Academic Warning
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 Warning.

Failing to Meet Minimum GPA Requirement
Students who fail to maintain the required minimum cumulative GPA will be placed on Academic Warning the semester following the one where their cumulative GPA falls below the minimum required GPA. Students are removed from Academic Warning as soon as their cumulative GPA is above the minimum required GPA. Students who earn a 2.0 during their probationary semester but do not raise their cumulative GPA above the minimum requirement will continue Academic Warning until their cumulative average meets the minimum requirement.

While on Academic Warning, 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 Warning 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 a 12-month period.

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 Warning 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 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. 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 Registrar's Office. Withdrawal Notice Forms may be downloaded from the Student Record 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:

1. 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.

2. 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.

3. 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.

Please refer to SIT student handbook for information on withdrawal from SIT.

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 "I" in any class in that semester. The student will be withdrawn from the Institute, effective his or her last day of attendance. Students seeking readmission must abide by the Institute'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.

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

1. Students must be matriculated.

2. Students must be registered full-time in credit-bearing courses.

3. Full-time students must complete 12 or more credits in one semester.

4. Only passing grades ("A," "B," "C," and "D") in credit-bearing courses are counted for eligibility.

5. No failing grades: a grade of "F" in any course makes the student ineligible, regardless of other grades.

6. Minimum GPA of 3.5 is required.

7. Any courses that do not count towards the degree are excluded.

8. AP, Internship, and Independent Study credits are excluded.

9. Pass/Fail credits are NOT to be counted when calculating qualifying credits.

10. 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. Academic records will be kept indefinitely.

Other Disputes
Students who feel that they have any other type of dispute with the Institute should file a complaint with the relevant Department Chair or supervisor. A copy of the complaint shall be given to those involved with the dispute. If the student is not satisfied with the decision of the Department Chair or supervisor, a second complaint may be submitted to the Director of Operations. If the student is not satisfied with the decision of the Director of Operations, he or she may appeal to the Chief Operating Officer. If the student is still dissatisfied with the decision, he or she may appeal to the President of the Institute.

Schools accredited by the Accrediting Commission of Career Schools and Colleges must have a procedure and operational plan for handling student complaints. If students do not feel that the Institute has adequately addressed a complaint or concern, they may consider contacting the Accrediting Commission. All complaints considered by the Commission must be in written form, with permission from the complainant(s) for the Commission to forward a copy of the complaint to the Institute for a response. The complainant(s) will be kept informed as to the status of the complaint as well

as the final resolution by the Commission. Please direct all inquiries to:

Accrediting Commission of Career Schools and Colleges
2101 Wilson Boulevard, Suite 302
Arlington, VA 22201
U.S.A
1-703-247-4212
www.accsc.org

A copy of the Commission's Complaint Form is available at the Institute and may be obtained by contacting Gabriel Lee, Director of Operations. If you are not sure of whom to speak to regarding a complaint, please contact Gabriel Lee at the following address:

DigiPen Institute of Technology Singapore
10 Central Exchange Green,
#01-01
Singapore 138649

Telephone: +65 6577 1900
Facsimile: +65 6577 1908

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. Students who have any questions regarding this matter should contact the Registrar's office at +65 6577 1900.

To request an official transcript, students should complete a transcript request form (available online or from the Administration office) and either mail or fax it to the Administration office. Requests are usually processed within three to five business days. Unofficial grade reports can be viewed or printed anytime using the Student Record 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 the instructor's 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. Bachelor of Science in Computer Science in Real-Time Interactive Simulation 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 Registrar's Office, along with any additional materials needed for the major to which they would like to transfer. The Change of Major form is available online. In addition, students need to contact SIT's admission department to undertake the necessary process stipulated by SIT.

Students who wish to switch to either of the Game Design degrees must submit any extra materials (Game Modification Analysis Essay and Character/World Analysis Essay) before the change of major can be evaluated. Please submit colored copies or electronic files as originals will not be returned. 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

1. 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.

2. Students requesting 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 the Institute.

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

4. 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 warning and will have to complete their program requirements under the conditions of their academic warning. For more information, please see the section on "Academic Warning."

Applying for Graduation

The Institute sets minimum requirements for all students seeking undergraduate degrees. The Institute 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 incomplete portion of coursework.

Most students will follow the graduation requirements published in the catalog for the year they enter the Institute. 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 Registrar's Office.

Students are responsible for notifying the Registrar's Office of any changes in their proposed programs and for resolving any questions prior to registering for their final term at the Institute.

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
August	April 1
December	August 1

Table 1.1

1. The student completes the Graduation Application and submits the S$214.00 (inclusive of 7% GST) graduation fee by the deadlines stated in Table 1.1.

2. 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.

3. 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 Registrar's Office informed of address changes so that the degree is mailed to the correct address.

Student Affairs

Student Advising

The Institute has adopted a faculty advisor model to provide academic and career-related advising for students. Each student is assigned a full-time faculty member as an academic advisor. Advisors provide answers to academic questions, approve extra classes, and perform degree audits and other administrative functions. Students meet with their advisor during new student orientation and are encouraged to meet with their advisors at any time during their education. Advisors are instructed to follow up with advisees once a semester, especially during class registration time. Students are required to seek advisor approval for academic status changes, such as changing majors or applying for graduation.

Placement Assistance

Advice on career options is available to enrolled students. With the assistance of Student Affairs and faculty members, the Student Affairs work 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, the Institute hosts an annual career day that attracts employers from around the country to the campus to review student portfolios and conduct interviews. The Institute 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 Student Affairs. Please note that employment upon graduation is not guaranteed.

Special Needs

DigiPen Institute of Technology Singapore strives to ensure that all students are provided with an equal opportunity to participate in the college's programs, courses, and activities, Students requiring special assistance must self-identify to the Student Affairs and provide current documentation supporting their disability. Students must assist in identifying the proper accommodations and negotiate these accommodations at the beginning of each semester. The Institure will provide reasonable accommodations and academic adjustments as long as provisions do not fundamentally alter the nature of the programs 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 the Institute alumni are encouraged to report back regarding changes to their professional status. DigiPen Institute of Technology hosts an annual reunion at the Game Developer's Conference and extends placement services to all alumni. DigiPen Institute of Technology Singapore graduates will be welcome to attend these U.S. alumni events.

Educational Rights and Privacy of Student Records

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

1. 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.

2. 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.

3. 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 online Student Records System.

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 Registrar's Office that he or she does not wish any information released:

1. Name

2. Local telephone number

3. Institute email address

4. Major field of studies

5. Dates of attendance

6. Degrees and awards received

7. Full-time or part-time enrollment status

8. Number of credits for which a student is registered each semester

9. 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 the Institute'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 Institute 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 Institute network. In order for the Institute faculty to review and grade projects and assignments, source code must be stored and executables must be generated at the Institute 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 the Institute's faculty member or 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 the Institute's instructors prior to commencement of any production. The Institute reserves the right to reject ideas or to stop production of any student game, animation, or project for reasons deemed appropriate to the Institute. 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. 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.

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

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

11. 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 the Institute. 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 Institute community who violates this policy shall be subject to appropriate disciplinary action up to and including dismissal from the Institute and shall be subject to all appropriate procedures and penalties including, but not limited to, the application of the criminal trespass provisions of the law of the Republic of Singapore. Any person who is not a member of the Institute 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 the law of the Republic of Singapore. Members of the Institute community who are aware of any violations of this policy or who have other concerns about safety or weapons should report them to the Dean of Faculty, Director of Operations, or the Chief Operating Officer.

12. 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.

13. 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.

14. 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.

15. 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.

16. 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.

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

18. The assault of individuals, whether verbal, non-verbal, written, physical, including conduct, or any other kind of assault 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.

19. In accordance with applicable law, the Institute prohibits sexual harassment and harassment between employees, between students, and between employees and students. Harassment due to race, sex, color, national origin, ancestry, religion, physical or mental disability, veteran status, age, or any other basis protected by federal, state, or local law. may violate the law and will not be tolerated. The Institute's policy prohibits inappropriate conduct even though it may not reach the legal standard for harassment.

20. 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.

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

Penalties

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:

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

2. 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.

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

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

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

6. 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 law of the Republic of Singapore 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

2012-2013

Bachelor of Science in Computer 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 Computer Science in Real-Time Interactive Simulation prepares programmers for these industries. Designed and developed by industry experts and DigiPen Institute of Technology faculty, the Institute's four-year Bachelor of Science in Computer Science in Real-Time Interactive Simulation program is a computer science degree that is highly focused on the technical area of graphics and simulations. Participants in the Bachelor of Science in Computer Science in Real-Time Interactive Simulation program specialize in the skills and tools necessary to create real-time simulations of real-life events and imaginary situations.

The Bachelor of Science in Computer Science in Real-Time Interactive Simulation 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, Bachelor of Science in Computer Science in Real-Time Interactive Simulation 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. Bachelor of Science in Computer Science in Real-Time Interactive Simulation students gain the experience of designing, programming, and testing a variety of simulations and games, including text-based, scrolling, simulation, and 2D and 3D 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 2D and 3D 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.

Bachelor of Science in Computer Science in Real-Time Interactive Simulation Degree Requirements

Number of Credits & GPA
The Bachelor of Science in Computer Science in Real-Time Interactive Simulation 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 and COM 150. Five additional ENG credits are required from ENG 116 and above. Students must take an additional three credits in HIS, PSY, or SOS. (Total: 14 credits)

Art Requirement
Students are required to take ART 210, CG 130 and two additional credits from the following: ANI 125, ART 400, FLM 115, FLM 151, FLM 152, FLM 275, or ART 410. (Total: 7 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, GAM 300, GAM 350, GAM 400, and GAM 450. (Total: 34 credits)

Electives
Students must complete seven to nine credits of elective courses, which students can choose from any department at the Institute. (Total: 7-9 credits)

Grade Requirement and Core Courses
Students must receive a grade of "C-" or higher in all core courses for the Bachelor of Science in Computer Science in Real-Time Interactive Simulation 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 Bachelor of Science in Computer Science in Real-Time Interactive Simulation: ART 210 (2), ART elective (2), COM 150 (3), ENG 110 (3), ENG electives numbered ENG 116 or higher (5), a social science elective in HIS, PSY, or SOS (3), MAT 150 or MAT 180 (4), MAT 250 (3), 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 Com-

puter 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.

Credit Transfers for Graduates with Related Diplomas from Local Polytechnics
The Institute and SIT entered into collaboration on March 2010 to offer an admission pathway for graduates with related diplomas from the five local polytechnics, namely:

- Nanyang Polytechnic
- Ngee Ann Polytechnic
- Republic Polytechnic
- Singapore Polytechnic
- Temasek Polytechnic

Students should refer to the SIT website at *www.singaporetech.edu.sg* for information on related diplomas.

Under this collaboration, students may transfer certain credits for courses that they have successfully completed at their respective polytechnics.

The Institute will communicate to these students their respective course sequences after taking into consideration the approved credit transfers. Students will also be informed of any other necessary bridging courses and/or additional electives that they need to successfully complete in order to meet the requirements to graduate with a degree from the Institute.

Any clarifications on course sequences for graduates from these polytechnics under the SIT collaboration scheme should be directed to the Registrar at the Institute.

Recommended Course Sequence Chart (Bachelor of Science in Computer Science in Real-Time Interactive Simulation)

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 & 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
	COM 150	Interpersonal and Work Communication		3
	HSS Elective	One humanities & social science elective from any three-credits HIS, PSY, or SOS courses		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, & 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
	CG 130	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
	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 the Institute		3
			Semester Total	**20**
Semester 7	Art Elective	Select one: ANI 125, ART 400, FLM 115, FLM 151, FLM 152, 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
	Math Elective	MAT 256 or any MAT course greater than 300	X	3
	GAM 400	Project IV	X	5
	Elective	An elective of the student's choice from any department at the Institute		3
			Semester Total	**18-21**
Semester 8	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
	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 the Institute		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 industry matures, 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 animation skills. Industry-quality standards continue to rise, and competition for entry-level positions demands that animators possess sophisticated skill sets before they can even begin their careers. Studios seek animators 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, animation remains a viable career opportunity. 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 animation education.

The broad scope of these demands presents a series of significant academic challenges. Most current animation 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 animators 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 Institute of Technology's Bachelor of Fine Arts in Digital Art and Animation seeks to address these needs. Examples of student projects can be found in DigiPen's Digital Gallery. Students who successfully complete this curriculum 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 specialized 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 3D animation, digital 2D animation, and 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 & 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: 34 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 and 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, ART 399, ART 405, CG 251, CG 303, CG 305, CG 315, CG 350, CG 360, CG 399, CG 410, ANI 300, ANI 350, ANI 399, ANI 400, ANI 450, BIO 225, BIO 399, FLM 210, FLM 215, FLM 250, FLM 275, FLM 350, FLM 360, FLM 399, ENG 242, ENG 243, ENG 245. (Total: 24 credits)

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.

Credit Transfers for Graduates with Related Diplomas from Local Polytechnics
The Institute and SIT entered into collaboration on March 2010 to offer an admission pathway for graduates with related diplomas from the five local polytechnics, namely:

- Nanyang Polytechnic
- Ngee Ann Polytechnic
- Republic Polytechnic
- Singapore Polytechnic
- Temasek Polytechnic

Students should refer to the SIT website at *www.singaporetech.edu.sg* for information on related diplomas.

Under this collaboration, students may transfer certain credits for courses that they have successfully completed at their respective polytechnics.

The Institute will communicate to these students their respective course sequences taking into consideration the approved credit transfers. Students will also be informed of any other necessary bridging courses and/ or additional electives that they need to successfully complete in order to meet the requirements to graduate with a degree from the Institute.

Any clarifications on course sequences for graduates from these polytechnics under the SIT collaboration scheme should be directed to the Registrar at the Institute.

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	X	4
	BIO 100	Visual Perception	X	3
	ENG 116	Storytelling	X	4
	FLM 115	History of Film and Animation	X	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	2D Raster Graphics and Animation	X	3
	CG 225	Introduction to 3D Animation	X	3
	PRJ 201	2D Animation Production	X	5
			Semester Total	17
Semester 4	Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list	X	3
	ART 251	Character Design	X	3
	Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list	X	3
	CG 275	3D Character Animation	X	3
	PRJ 251	2D Vector Animation Production	X	5
			Semester Total	17
Semester 5	Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list	X	3
	ART 300	Perspective, Backgrounds, and Layouts	X	3
	CG 300	3D 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	Animation (ANI) Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list.	X	3
	PHY 115	Introduction to Applied Math and Physics		3
	Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list	X	3
	FLM 201	Cinematography	X	3
	PRJ 350	3D Animation Production	X	5
			Semester Total	17
Semester 7	ART 401	Conceptual Illustration and Visual Development	X	3
	Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list	X	3
	Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list	X	3
	ART 450	Portfolio	X	3
	PRJ 400	Capstone Project I	X	5
			Semester Total	17
Semester 8	Elective Requirement (ART, CG, ANI, FLM)	Any course from the Elective Requirement list	X	3
	SOS 115	Media and Ethics: A Social Science Perspective		3
	CS 115	Introduction to Scripting and Programming		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.

Game Design Degree Programs

Overview

The designers of digital entertainment fill a unique role that combines art, technology, innovation, storytelling, history, psychology, and many other disciplines. This multidisciplinary program leads to one of two degrees: the Bachelor of Science in Game Design (BSGD) or the Bachelor of Arts in Game Design (BAGD). At DigiPen, both of these degree programs are designed to educate students to become game developers with the skills necessary to design levels, games, systems, and characters. In addition, the BSGD prepares students to become technical designers with the skills necessary to program games, behaviors, and user interfaces. On the other hand, the BAGD prepares students to become artistic designers with the skills necessary to create interesting stories, worlds, environments, and visuals. Students graduating with either degree will be prepared to begin working in the computer software and video games industries.

Students in the Game Design degree programs learn how to apply the software, tools, and processes used in this industry to challenging problems that practitioners in the field regularly encounter. They learn communication skills, both written and verbal, and practice those skills through presentations, proposals, and design documents. Like other DigiPen degree programs, students in the Game Design degree programs participate in several team-based projects. These projects are designed to give students concrete experiences in which they apply the theoretical knowledge gained from their other courses and emphasize teamwork, accountability, commitment, and testing. Game Design students gain the experience of designing, building, testing, and polishing a variety of games, including dice games, card games, board games, role-playing games, digital and non-digital simulations, 2D digital games, and 3D digital games.

Bachelor of Science in Game Design

Program Overview

This degree program prepares graduates to design and build interactive digital entertainment. Graduates will be well versed in game design theory for digital and non-digital games, level design, system design, and behavior design. Graduates will have extensive experience testing, iterating, and polishing both digital and non-digital designs. Graduates will also be familiar with the tools commonly used in the industry by designers, artists, producers, and programmers, including level editors, drawing software, modeling software, scheduling tools, compilers, and databases. This interdisciplinary degree also provides a foundation in mathematics and the humanities.

The game industry requires designers to be versatile and skilled in more than just design. Technical designers must be able to implement designs, so the BSGD program stresses the importance of being able to write computer programs in core languages such as C and C++, as well as the scripting languages commonly used by technical designers. Graduates will be well versed in programming game logic, user interfaces, artificial intelligence, databases, and design tools.

Graduates of this degree program will be prepared to work in the video game industry as entry-level programmers, artificial intelligence programmers, user interface programmers, tools programmers, scripters, level designers, system designers, and game designers. Some of the job titles that graduates of this program may aspire to are Computer or Software Programmer, Software Engineer, Gameplay Programmer, Artificial Intelligence Programmer, User Interface Programmer, Tools Programmer, Game Scripter, Level Designer, System Designer, Content Designer, Technical Designer, Game Designer, Design Director, and Creative Director

BSGD Degree Requirements

Number of Credits and GPA

The Bachelor of Science in Game Design (BSGD) requires completion of at least 154 semester credits with a cumulative GPA of 2.0 or better. The program usually spans eight semesters of fifteen weeks each, or four academic years.

Grade Requirements and Core Courses

Students must receive a grade of "C-" or higher in all core courses for the Bachelor of Science in Game Design. (In a non-core course, a grade of "D" is considered passing.) The core courses are defined as follows: all courses taken to fulfill the Projects, Mathematics, Computer Science, and Physics requirements, PSY 101, ENG 110, ENG 120.

Humanities and Social Science Requirement

The following courses are required: COM 150, ENG 110, ENG 120, and PSY 101. Three credits must be selected from any courses in the Humanities and Social Sciences department (SOS, HIS, PHL, PSY, or other) offered at the Institute. (Total: 15 credits)

Art Requirement

The following courses are required: ART 102 or ART 101, ART 126 or ART 125, ART 260, ART 310, CG 102 or CG 201, and CG 125 or CG 225. (Total: 18 credits)

Projects Requirement

The following courses are required: GAM 100, GAM 150, GAM 200, GAM 250, GAM 302, GAM 352, GAT 110, GAT 210, GAT 211, GAT 212, GAT 240, GAT 250, GAT 251, GAT 315, and GAT 316. Two courses from the following list are also required: GAM 375, GAM 390, GAM 400, GAM 450, and GAM 490. (Total: 61 credits)

Computer Science Requirement

The following courses are required: CS 101 or CS 102, CS 120, CS 120L, CS 170, CS 170L, CS 180, CS 225, CS230, CS 251, CS 280, CS 330, and CS 380. (Total: 33 credits)

Mathematics Requirement

The following courses are required: MAT 140, MAT 150 or MAT 180, MAT 200 or MAT 230, MAT 258, and MAT 364. (Total: 18 credits)

Physics Requirement

One course is required: PHY 200. (Total: 3 credits)

Electives

Complete six credits selected from any courses in any departments at the Institute. (Total: 6 credits)

Note on General Education Courses

The following courses satisfy the general education requirement for the BSGD: COM 150 (3), ENG 110 (3), ENG 120 (3), MAT 140 (4), MAT 150 or MAT 180 (4), MAT 200 or MAT 230 (4), MAT 258 (3), PHY 200 (3), PSY 101 (3), and one Humanities and Social Sciences elective (3). (Total: 33 credits)

Recommended Course Sequence

Listed on the page is the recommended course sequence for the Bachelor of Science in Game Design. Please note the following:

- Students must receive a "C-" or higher in the core courses to earn credit toward this degree.

Credit Transfers for Graduates with Related Diplomas from Local Polytechnics

The Institute and SIT entered into collaboration on March 2010 to offer an admission pathway for graduates with related diplomas from the five local polytechnics, namely:

- Nanyang Polytechnic
- Ngee Ann Polytechnic
- Republic Polytechnic
- Singapore Polytechnic
- Temasek Polytechnic

Students should refer to the SIT website at *www.singaporetech.edu.sg* for information on related diplomas.

Under this collaboration, students may transfer certain credits for courses that they have successfully completed at their respective polytechnics.

The Institute will communicate to these students their respective course sequences after taking into consideration the approved credit transfers. Students will also be informed of any other necessary bridging courses and/or additional electives that they need to success-

fully complete in order to meet the requirements to graduate with a degree from the Institute.

Any clarifications on course sequences for graduates from these polytechnics under the SIT collaboration scheme should be directed to the Registrar at the Institute.

Recommended Course Sequence Chart (BSGD)

Semester	Course	Course Title	Core	Credits
Semester 1	CS 101	Introduction to Computer Environment	X	1
	CS 120	High-Level Programming I - The C Programming Language	X	3
	CS 120L	High-Level Programming I Lab	X	1
	ENG 110	Composition	X	3
	GAM 100	Project Introduction	X	3
	GAT 110	Game History	X	3
	MAT 140	Linear Algebra & Geometry	X	4
	PSY 101	Introduction to Psychology	X	3
			Semester Total	**21***
Semester 2	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
	ENG 120	Research, Reasoning, and Writing	X	3
	GAM 150	Project I	X	3
	GAT 210	Game Mechanics I	X	3
	MAT 150 or MAT 180	Calculus & Analytic Geometry I or Vector Calculus I	X	4
			Semester Total	**20***
Semester 3	CS 225	Advanced C/C++	X	3
	CS 180	Operating System I, Man-Machine Interface	X	3
	MAT 200 or MAT 230	Calculus & Analytic Geometry II or Vector Calculus II	X	4
	PHY 200	Motion Dynamics	X	3
	GAT 211	Game Mechanics II	X	3
	GAM 200	Project II	X	4
			Semester Total	**20**
Semester 4	CS 280	Data Structures	X	3
	COM 150	Interpersonal & Work Communication		3
	ART 102	Fundamentals of Visual Expression		3
	GAT 212	Advanced Game Mechanics	X	3
	GAT 240	Technology for Designers	X	3
	GAM 250	Project II	X	4
			Semester Total	**19**
Semester 5	CS 380	Artificial Intelligence for Games	X	3
	CS 251	Introduction to Computer Graphics	X	3
	ART 126	Principles of Composition and Design		3
	ART 260	Graphic Design, User Experience, and Input	X	3
	GAT 250	2D Game Design I	X	3
	GAM 302	Project for Game Designers	X	5
			Semester Total	**20**
Semester 6	ART 310	Architectural Spaces, Design and Lighting I		3
	CG 125	Introduction to 3D Production for Designers		3
	CG 102	2D Raster and Vector Graphics for Designers		3
	GAT 251	2D Game Design II	X	3
	GAM 352	Project for Game Designers	X	5
	MAT 258	Discrete Mathematics	X	3
			Semester Total	**20**
Semester 7	CS 330	Algorithm Analysis	X	3
	GAT 315	3D Game Design I	X	3
	Elective	An elective of the student's choice from any department at the Institute		3
	CS 311	Introduction to Databases	X	3
	MAT 364	Combinatorial Game Theory	X	3
	GAM 400	Project IV	X	5
			Semester Total	**20**
Semester 8	GAT 316	3D Game Design II	X	3
	Elective	Any elective of the student's choice from any department at the Institute		3
	HSS Elective	Any three-credit course from the Department of Humanities and Social Sciences offered at the Institute.		3
	GAM 450	Project IV	X	5
			Semester Total	**14**
			Degree Total	**154 minimum**

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

Bachelor of Arts in Game Design

Program Overview

This degree program prepares graduates to design and build interactive digital entertainment. Graduates will be well versed in game design theory for digital and non-digital games, level design, system design, and general art skills. Graduates will have extensive experience testing, iterating, and polishing both digital and non-digital designs. Graduates will also be familiar with the tools commonly used in the industry by designers, artists, and producers, including level editors, drawing software, modeling software, and scheduling tools. This interdisciplinary degree also provides a foundation in computer programming and the humanities.

The game industry requires designers to be versatile and skilled in more than just design. Artistic designers must be able to create written or visual content, so the BAGD program allows students to select either an emphasis in visual design or an emphasis in writing and storytelling. Graduates with a visual design emphasis will build on their general art skills and be able to create art assets for games, such as vector art, textures, and models. Graduates with a writing and storytelling emphasis will build on their general writing skills and be able to create characters, history, dialogue, and interactive stories for games.

Graduates of this degree program will be prepared to work in the video game industry as entry-level writers, scripters, level designers, system designers, and game designers. Some of the job titles that graduates of this program may aspire to are Writer, Artist, Game Scripter, Level Designer, System Designer, User Interface Designer, Content Designer, Quest Designer, Game Designer, Design Director, and Creative Director

BAGD Degree Requirements

Number of Credits & GPA
The Bachelor of Arts in Game Design (BAGD) requires completion of at least 147 semester credits with a cumulative GPA of 2.0 or better. The program usually spans eight semesters of fifteen weeks each, or four academic years.

Grade Requirements and Core Courses
Students must receive a grade of "C-"or higher in all core courses for the BAGD major. (In a non-core course, a grade of "D" is considered passing.) The core courses are defined as follows: all courses taken to fulfill the Projects, Art, Mathematics, Computer Science, and Specialization requirements, PSY 101, ENG 110, ENG 120.

Humanities and Social Science Requirement
The following courses are required: COM 150, ENG 110, ENG 120, HIS 100, HIS 150, MGT 451, and PSY 101. Three credits must be selected from any courses in the Humanities and Social Sciences department (SOS, HIS, PHL, PSY, or other) offered at the Institute. (Total: 24 credits)

Art Requirement
The following courses are required: ART 101 or ART 102, ART 125 or ART 126, ART 260, ART 310, CG 102 or CG 201, CG 125 or CG 225, FLM 151, and FLM 275. (Total: 24 credits)

Projects Requirement
The following courses are required: GAM 100, GAM 152, GAM 202, GAM 252, GAM 302, GAM 352, GAT 110, GAT 210, GAT 211, GAT 212, GAT 240, GAT 250, GAT 251, GAT 315, GAT 316, GAT 330, and GAT 405. Two courses from the following list are also required: GAM 375, GAM 390, GAM 400, GAM 450, and GAM 490. (Total: 61 credits)

Mathematics Requirement
Students must take MAT 103. (Total: 4 credits)

Science Requirement
Students must take PHY 115 or PHY 200. An additional three credits must be selected from courses labeled BIO or PHY. (Total: 6 credits)

Computer Science Requirement
The following courses are required: CS 116, CS 175 or CS 170, and CS 176 or CS 225. A combination of CS 120 and CS 101 or CS 120 and CS 102 can replace CS 116. (Total: 10 credits)

Specialization
Students are required to take 15 credits of "specialization" courses, which must be selected from any of the following offered at the Institute: any ENG, ART, CG, or ANI course, any 200 level or higher FLM, SOS, HIS, PHL, PSY, MAT, CS, PHY, or BIO course. The following cannot be counted as "specialization" courses: ENG 450, ART 210, ART 299, ART 400, ART 410. (Total: 15 credits)

Electives
Complete three credits selected from any courses in any departments at the Institute. (Total: 3 credits)

Note on General Education Courses
The following courses satisfy the general education requirement for the BAGD: COM 150 (3), ENG 110 (3), ENG 120 (3), HIS 100 (3), HIS 150 (3), MAT 103 (4), PSY 101 (3), PHY 115 or PHY 200 (3), one additional BIO or PHY course (3), and one Humanities and Social Sciences elective (3), for a total of 31 credits.

Recommended Course Sequence
Listed on the following page is the recommended course sequence for the Bachelor of Arts in Game Design. Please note the following:

- Students must receive a "C-" or higher in the core courses to earn credit toward this degree.

Credit Transfers for Graduates with Related Diplomas from Local Polytechnics
The Institute and SIT entered into collaboration on March 2010 to offer an admission pathway for graduates with related diplomas from the five local polytechnics, namely:

- Nanyang Polytechnic
- Ngee Ann Polytechnic
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- Temasek Polytechnic

Students should refer to the SIT website at *www.singaporetech.edu.sg* for information on related diplomas.

Under this collaboration, students may transfer certain credits for courses that they have successfully completed at their respective polytechnics.

The Institute will communicate to these students their respective course sequences taking into consideration the approved credit transfers. Students will also be informed of any other necessary bridging courses and / or additional electives that they need to successfully complete in order to meet the requirements to graduate with a degree from the Institute.

Any clarifications on course sequences for graduates from these polytechnics under the SIT collaboration scheme should be directed to the Registrar at the Institute.

Recommended Course Sequence Chart (BAGD)

Semester	Course	Course Title	Core	Credits
Semester 1	ENG 110	English Composition	X	3
	CS 116	Introduction to Computer Technology and Programming	X	4
	GAM 100	Project Introduction	X	3
	GAT 110	Game History	X	3
	PSY 101	Introduction to Psychology	X	3
	MAT 103	Precalculus with Discrete Mathematics	X	4
			Semester Total	**20***
Semester 2	ART 102 / ART 101	Fundamentals of Visual Expression / The Language of Drawing	X	3
	ENG 120	Research, Reasoning, and Writing	X	3
	GAT 210	Game Mechanics I	X	3
	GAM 152	Scripting Project	X	3
	CS 175	Scripting Languages	X	3
	PHY 115	Introduction to Applied Math and Physics		3
			Semester Total	**18***
Semester 3	GAM 202	Game Usability and Analysis	X	1
	FLM 151	Visual Language and Film Analysis	X	3
	CS 176	Advanced Scripting	X	3
	GAT 211	Game Mechanics II	X	3
	GAT 250	2D Game Design I	X	3
	ART 126 / ART 125	Principles of Composition & Design / Tone, Color and Composition	X	3
	BIO 100	Visual Perception		3
			Semester Total	**19**
Semester 4	GAT 251	2D Game Design II	X	3
	GAM 251	Advanced Usability and Process	X	1
	ART 310	Architectural Spaces, Design and Lighting I	X	3
	COM 150	Interpersonal and Work Communication	X	3
	GAT 212	Advanced Game Mechanics	X	3
	CG 102	2D Raster Graphics and Animation for Designers	X	3
	CG 125	Introduction to 3D Production for Designers	X	3
			Semester Total	**19**
Semester 5	GAT 315	3D Game Design I	X	3
	Specialization Course	Any course from the "specialization" list	X	3
	FLM 275	Fundamentals of Music and Sound Design		3
	Specialization Course	Any course from the "specialization" list	X	3
	ART 260	Graphic Design, User Experience, and Input	X	3
	GAM 302	Project for Game Designers	X	5
			Semester Total	**20**
Semester 6	Specialization Course	Any course from the "specialization" list	X	3
	GAT 316	3D Game Design II	X	3
	GAT 240	Technology for Designers	X	3
	Specialization Course	Any course from the "specilization" list	X	3
	GAM 352	Project for Game Designers	X	5
			Semester Total	**17**
Semester 7	HIS 100	Introduction to World History I		3
	GAT 330	Interactive Narrative and Character Creation for Games	X	3
	GAT 405	Advanced Game Design	X	3
	Specialization Courses	Any course from the "specilization" list	X	3
	GAM 400	Project IV	X	5
			Semester Total	**17**
Semester 8	HIS 150	Introduction to World History II		3
	HSS Elec	Any three-credit course from the Department of Humanities and Social Sciences offerd at the Institute		3
	Elective	An elective of the student's choice from any department at the Institute		3
	MGT 451	Project Management		3
	GAM 450	Project IV	X	5
			Semester Total	**17**
			Degree Total	**147 minimum**

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

**COURSE DESCRIPTIONS FOR
THE ACADEMIC YEAR**

2012-2013

Course Descriptions Table of Contents

Listed below are the various Departments and Course Topics, with their corresponding page numbers.

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 102 Computer Environment (4 Cr.)

Prerequisite(s): None

This course provides an introduction to digital computer organization. Topics covered include basic electricity, electrical circuits, encoding of numeric and non-numeric data, digital systems, logic circuits and algebra, arithmetic and logic unit, memory unit, basic computer architecture and introduction to operating systems. The outcome of this course is to provide students with sound knowledge of the fundamental building blocks of the functional units of digital computer systems.

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 covers simple logic, programming flow, and the use of variables. It introduces 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 116 Introduction to Computer Technology and Programming (4 Cr.)

Prerequisite(s): None

This class introduces programming environments to students who are not enrolled in a science degree program at DigiPen. The course provides students with an introductory overview of the fundamental elements on which computers are based, including basic computer hardware systems, operations, and structures. An introduction to basic programming includes simple logic, programming flow, loops, variables, and arrays. Conditionals, evaluations, and other control structures are also included. The instructor may cover special topics in programming or scripting and may focus on currently popular scripting languages in the video game industry.

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 of 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 intensively discusses 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 meet for two hours weekly to apply the concepts presented in CS 120 in a lab 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 meet weekly to work on topics presented in the CS 170 lectures in a lab environment.

CS 175 Scripting Languages (3 Cr.)

Prerequisite(s): CS 116 or CS 120

This course covers the concepts and implementation strategies for using high-level scripting languages in game development. Students focus on object-oriented programming, high-level English-like structure, speed of development, and ease of use. The course includes a survey of commercial languages, as well as proprietary scripting languages from industry applications. Students examine the process of conceptualizing a syntax for a game-based scripting language and examine how such a language is compiled and interpreted by a game engine. Using the syntax students have created, they create a number of scripts that could be used in a game. Additionally, the class covers relevant topics such as data-driven technology, modular coding, function calls, and procedures.

CS 176 Advanced Scripting (3 Cr.)

Prerequisite(s): CS 170 or CS 175

This course presents game implementation techniques and game architecture in a scripting language environment. Students investigate 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. Students learn how to create several different types of classic games in a variety of scripting languages most commonly used for professional games, learning the specific syntax and approaches of each language in the process. As part of their implementation, students learn how to use the specific graphics, audio interface, physics and math APIs found in the scripting environments used. Students survey concepts in space partitioning, particle systems, map editors and other elements so that they are capable of creating working prototypes of 2D games.

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

Prerequisite(s): CS 101 or CS 102 & 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, the following is also covered: 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 2D 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 3D 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 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 create and expand their own collision, vector, and matrix libraries, enabling them to incorporate basic physics engines. Students 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 simulations and video games. The subjects include mixing audio and modulating dry recorded sounds using wave table synthesis. Students 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 also study algorithms and techniques for real-time multi-threaded programming and synthesized sound integration for game engines.

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 3D computer graphics applications, such as games, cockpit simulators, and architectural walk-throughs. 3D computer graph-ics 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 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 251 Introduction to Computer Graphics (3 Cr.)

Prerequisite(s): CS 170

This course provides a high-level overview of 3D computer graphics. It is intended for game designers and artists to enable them to understand the fundamental components of graphics engine and their applications in real-time simulation and video game software. Course topics include graphics pipeline architecture, 3D transformation operations, viewing and projection, lighting and shading models, surface detail techniques, shadow algorithms, hidden object culling and removal techniques, 3D object modeling, and animation and physically-based motion control. The popular graphics programming languages (GDI plus, OpenGL, DirectX) and shader programming are also discussed in the course.

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 gives 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 covers additional topics based on the state of the industry.

CS 280 Data Structures (3 Cr.)

Prerequisite(s): 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 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 102, CS 120, CS120L & 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, 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 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

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 apply acquired knowledge to a substantial project.

CS 370 - Computer Imaging (3 Cr.)

Prerequisite(s): CS 280

The course is taught at the upper division/graduate level and, brings 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 371 - Advanced Computer Imaging (3 Cr.)

Prerequisite(s): CS 370

This course introduces the Computer Vision pipeline. Students learn, and implement state-of-the-art methods in Image Analysis, Feature Detection, Face Recognition and Computational Photography. This course provides computational skills that are complementary to the Computer Graphics curriculum and reinforces the larning activity with a hands-on implementation approach.

CS 380 Artificial Intelligence for Games (3 Cr.)

Prerequisite(s): CS 225, CS 280

This course introduces students to a wide range of concepts and practical algorithms that are commonly used to solve game AI problems. Case studies from real games are used to illustrate the concepts. Students have a chance to work with and implement core game AI

algorithms. Topics covered includes 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 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. The effectiveness of genetic algorithms and power of a neuro-genetic approach are demonstrated. The class concludes by looking at inductive analytical learning.

CS 388 – Introduction to Portable Game System Development (3 Cr.)

Prerequisite(s): CS 250 & GAM 250

This course introduces students to portable game systems programming and development, which is different from PC programming and development due to the embedded structure of the machine. Students work with a very limited amount of memory and CPU power. To overcome the system's memory limitations, several graphics techniques are used, such as tile based game objects and backgrounds using color palettes. As for the CPU limitations, fixed point decimal is used instead of float numbers, along with asynchronous operations. Several portable game

system specific topics, such as managing multiple graphics engines simultaneously and handling the touch pad are discussed.

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 may 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 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 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, CG 130, & 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 learn a behavior-based technique, which generates motion that satisfies a set of rules, such as kinematics, physics, or other constraints.

CS 488 Introduction to Console Development (3 Cr.: 2 credits lecture, 1 credit lab)

Prerequisites: GAM 250 & CS 250

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 work on a game project that takes advantage of the unique capabilities of gaming consoles.

Department of Fine Arts and Animation

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 explore the art of creating convincing movement through effective timing, spacing, and drawing. Works of master animators are 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 a character's 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 theater, animation, and film. Students explore the basic fundamentals and differences of acting for the stage, film, and animation through a series of acting exercises and problems. Special emphasis is given to classical method acting.

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

Prerequisite(s): ANI 101

In ANI 151 students continue to explore and exercise the concepts and techniques of classical animation through a series of assignments. The exercises in this course are considerably more demanding than those completed in ANI 101 as they are longer and will require more refinement, subtlety, and creativity. There is also 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 & CG 275

An animator's ability to express attitude, thought, and emotion through a surrogate is a fundamental skill of 3D character animation. This course builds upon the earlier acting and 2D animation curriculum. It explores 3D character animation techniques of performance, physicality and weight. Students complete a number of animation assignments during the semester.

ANI 350 Animation for Dialogue (3 Cr.)

Prerequisite(s): ANI 300

This course explores the nature of acting through the medium of the human voice. The curriculum explores narration, expressive reading, diction, and vocal refinement. It introduces 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 399 - Special Topics in Art (3 Cr.)

Prerequisite(s): PRJ 251

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

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 works 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 gain advanced instruction on more focused 'acting', 'physicality', and 'creature' animation. This class provides students with an ideal opportunity to improve an area of their portfolio work that will better represent animated 'body mechanics' and 'acting' skills.

ART

ART 101 The Language of Drawing (3 Cr.)

Prerequisite(s): None

Credit may be received for either ART 101 or ART 102, not both.

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 are given special consideration. Students are introduced to basic professional habits in drawing practice, drill, and play. Design principles, basic research, and the design process are 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 102 Fundamentals of Visual Expression (3 Cr.)

Prerequisite(s): None

Credit may be received for either ART 101 or ART 102, not both.

Students are introduced to simple drawing techniques, constructed linear perspective, visual design methodology, and drawing vocabulary through lectures, studio assignments, and simple projects.

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 are examined, and students 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

Credit may be received for either ART 125 or ART 126, not both.

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 introduces 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 then explore the artistic use of color. The course covers systems and traditions of organizing hue and saturation, and it examines methods of building from tonal preliminary studies. Students also explore classical forms of compositional organization, such as symmetry, asymmetry, golden mean, and figure-ground relationships.

ART 126 Principles of Composition & Design (3 Cr.)

Prerequisite(s): ART 101 or ART 102

Credit may be received either ART 125 or ART 126, not both

This course continues to build students' abilities to draw by exploring techniques for producing finished drawings, quick explanatory sketches, and rapid visualizations. Methods for use of tone and color to convey mood and atmosphere are covered. Basic graphic design and typography are taught with particular emphasis on interface design. Classical forms of compositional organization, such as symmetry, asymmetry, golden mean, and figure ground relationships, are also explored.

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

ART 155 - Basic Life Drawing and Anatomy (3 Cr.)

Prerequisite(s): ART 101

This course introduces students to the challenges of drawing the human form for animation. Students examine the goals of life drawing for animation, and the instructor demonstrates methods for attaining these goals. Additionally, students will study human skeletal and muscular anatomy and learn to apply this knowledge to drawing. The course emphasizes capturing skeletal structure, muscle form, emotion, and gesture. By drawing clothed and nude models of both genders, students learn to apply lessons in anatomy to the figure and significantly expand their understanding of human kinetics and structure. Finally, they practice extrapolating basic human life drawing strategies to drawing 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 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 build

the foundation for drawing accurate figures from their imagination. They also explore putting the figure into an environment, figurative composition, and introductory sequential figurative composition.

ART 205 Character and Environment Design (3 Cr.)

Prerequisite(s): ART 155

Students apply their drawing and anatomy knowledge to the creation of animation characters. The course introduces traditions of character design and the basic structural strategies for creating animation characters. Students explore simplification gradients relative to human, animal, and inanimate object-based characters. The course also covers issues of costume, personality, and story interaction. Additionally, students learn to place these characters into appropriately designed environments. The curriculum emphasizes professional applications, techniques, and standards of quality.

ART 210 Art Appreciation (2 Cr.)

Prerequisite(s): None

This introduction to art provides students with a better understanding of the artistic influences upon our modern culture. Along with the history of art, students 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 provides the groundwork for further personal study in the arts. In turn, this influences the development of their creativity.

ART 225 3D 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 become acquainted with additive, subtractive, and cast sculpture. They consider the basic concepts of architectural

space, interior design, landscape design, surface interplay with light, lofted forms, and skinning systems. Students use modern polymer clays and build an animation maquette.

ART 226 Gesture Drawing for Animation (3 Cr.)

Prerequisite(s): ART 101, ART 151, & BIO 150

In this class, the student is provided with significant time in front of live moving models. The main purpose of drawing moving models is to describe what the model is doing as opposed to what the form of the model is. All aspects of the drawing, including form, line, silhouette, details and most importantly, line of action, concentration on communicating visually what the model is doing and/or thinking. The course focuses on weight, depth, balance, tension, rhythm and flow.

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 enhance their understanding of the human form in 3D space. Emphasis is 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 is emphasized. Students explore masterworks, studio painting, and painting en plein aire. Technical and social problems related to painting are 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 234 Survey of Sequential Art (3 Cr.)

Prerequisite(s): ART 125 or ART 151

In this course, students learn to explore and to exploit the power of sequential images as a medium to craft stories beyond storyboarding, photography, and film. Through the formats of the graphic novel and related forms, students tackle problems of character and events; their solutions are limited only by their imaginations. The course begins with an historical overview of sequential art and then examines storytelling through pictures, focusing on clarity and emotional impact. Students examine contemporary styles and conventions and are required to draw from previous art experiences, while honing their skills in drawing, perspective, design, color, typography, writing, editing, and acting. Demonstrations of multimedia techniques and computer technology relative to this field are also introduced.

ART 251 Character Design (3 Cr.)

Prerequisite(s): ART 201

Students 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 explore simplification gradients relative to human, animal, and inanimate object-based characters. They consider issues of costume, personality, and story interaction. The course emphasizes professional applications, techniques, and standards of quality. The work completed in this course serves 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 explore elements of visual design and apply them to computer user interfaces. They analyze various types of sensory interfaces and improve their skills

in creating representations of information valuable to a system user. Additionally, emphasis is 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 learn how to use various industry-standard languages related to prototype interfaces.

ART 299 Special Topics in Art (2 Cr.)

Prerequisite(s): Permission of instructor

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

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 review classical depth cue and perspective systems and apply this knowledge to the creation of animation backgrounds and layouts. Additionally, students explore means of using drawing to create camera lens illusions, architectural space, theatrical sets, level design, matte painting, and surface texture. The course emphasizes professional applications, techniques, and standards of quality. The work completed in this course serves 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 builds upon all art disciplines, primarily 2D related skills, to prepare students for positions requiring the creation of concept art. Emphasis is placed on the importance of balancing speed of content generation with quality, as this is one of the most pressing

and relevant challenges in this field. With this mindset, students are challenged to evaluate and understand new forms of character and environment generation. Both theory and technique are 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 310 Architectural Spaces, Design, and Lighting I (3 Cr.)

Prerequisite(s): None

This course introduces students to the aesthetics and principles of 2D (floor plans and elevations) and 3D environment design. A survey of architectural styles from throughout the world is blended with concepts, such as emotion, mood, lighting, shadows, aesthetics, and more. The course emphasizes learning the architectural vocabulary as well as the aesthetics of environmental and game-level design. Texturing, spatial design, negative space, dramatic lighting, and other concepts that affect not only the psychology of level design but also gameplay principles are covered. Students participate in numerous field trips to local examples of architecture in order to gain an understanding of architectural spaces and the field's vocabulary.

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 leverage their knowledge of drawing, storytelling, and cinematography to create both production and presentation storyboards. They also explore means of using drawing to create story flow, character development, mood, time, and place. The course emphasizes professional applications, techniques, and standards of quality. The work completed in this course serves as pre-production design for PRJ 300, PRJ 350, or ANI 300.

ART 360 Architectural Spaces, Design, and Lighting II - Period Styles (3 Cr.)

Prerequisite(s): ART 310, CG 301, & CG 320

This class builds on the foundational skills and knowledge from Architectural Spaces, Design, and Lighting I (ART 310), covering more period styles. Additionally, students have opportunities to do more hands-on creation of art, models, and textures relative to various periods. Students participate in a variety of field trips in order to research and analyze architectural styles and then to build them in the computer lab.

ART 399 Special Topics in Art (3 Cr.)

Prerequisite(s): ART 151

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

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

ART 405 Matte Painting (3 Cr.)

Prerequisite(s): ART 401

This course takes the student through the process of designing and painting backgrounds (traditionally, digitally or both) that can be seamlessly integrated with live action footage, animation, and games.

ART 410 Mechanical Drawing (3 Cr.)

Prerequisite(s): None

Traditional and digital skills in drafting are key components of an engineering career. This course introduces students to the basic skills of mechanical drafting including layout and formatting conventions, typographic traditions, and classical drafting tool usage. Students apply these skills to actual problems in traditional mechanical drafting. They are then exposed to modern digital tools in mechanical drafting. The course explores subjects, such as interface conventions, usage strategies and output options. Students work with a CAD program and complete a variety of exercises designed to establish foundational skills. The course pays special attention to addressing how professionals use these skills in production and prototyping.

ART 450 Portfolio (3 Cr.)

Prerequisite(s): PRJ 350

Students use this course to compile the elements of their professional portfolio, which will serve as their BFA thesis. Additionally, this course introduces 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 use this knowledge to assemble their own portfolios. The course also covers related information regarding job interviews, trade shows, professional standards, and contract negotiation.

COMPUTER GRAPHICS

CG 102 2D Raster and Vector Graphics for Designers (3 Cr.)

Prerequisite(s): ART 126
Concurrent Course(s): CG 125

This course introduces students to 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, character development and animation for 2D games. Additionally, it looks at basic interface customization options and strategies in 2D raster 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. The class also 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 130 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 GAT 300)

CG 135 3D Computer Animation Production II (3 Cr.)

Prerequisite(s): CG 130

This course builds on the fundamentals taught in CG 130. Students learn about key framing, special effects, final rendering, and recording. (Earlier catalogs listed this course as GAT 350.)

CG 175 Introduction to 3D Character Animation for Designers (3 Cr.)

Prerequisite(s): CG 102, CG 125

This course introduces students to the basics of character design and animation. Students are introduced to the 3D character animation pipeline in progressively more complex sequences. Each iteration goes through the same basic principles of creating, editing, material/mapping, rigging, skinning, animating, camera/lighting setup and implementation of the assets into a game engine.

CG 201 2D 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. It also 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 industry-standard software and practices of 3D animation. The course begins with basic information such as interface organization strategies, equipment options, and production elements. It also 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 2D Vector Graphics and Animation (3 Cr.)

Prerequisite(s): CG 201

This course examines the principles and practices of 2D vector graphics and animation. It introduces students to industry standard software, output options, and production strategies for using vector graphics in both graphic design and animation. The course gives special consideration to critical thinking and refinement strategies when modifying vector images. Students 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 3D Character Animation (3 Cr.)

Prerequisite(s): CG 105 or CG 225

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

CG 300 3D 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 are considered. In order to provide students with a broader skill set, this course also presents the "mechanics" of how to use other 3D animation software, with an emphasis on the unique strengths of the package. Students explore the comparative strengths of different software packages and the impact that this has on workflow. The course emphasizes critical thinking skills and strategies for tool selection.

CG 301 3D Environment Design for Games (3 Cr.)

Prerequisite(s): ART 310, CG 102, & CG 125

This course provides game design students with an understanding of the design and production process of environments for 3D games. It introduces the principles of 3D environment creation and provides a functional working knowledge of modelling, texturing and lighting skills within the framework of a 3D modelling package to create

believable and well-designed environments. Student work is implemented into a game engine.

CG 303 Hard Surface Modeling and Texturing (3 Cr.)

Prerequisite(s): CG 275

Building on the knowledge and skills for modeling taught in CG275 "3D Character Animation," this course focuses on the process for optimized modeling and texturing of non-organic scene elements including architecture, props, and vehicles. Students are also introduced to digital sculpting for hard surface models

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 learn the tools and workflow of digital sculpting and enhance their knowledge of anatomy. As part of this class, students create a highly finished 3D character that is fully designed, modeled, posed, sculpted and textured. They also demonstrate knowledge of environmental sculpting.

CG 315 Texturing for 3D (3 Cr.)

Prerequisite(s): CG 201 & CG 275

This class focuses on how to generate efficient and accurate texture maps. Students explore techniques for generating landscape, architectural, objects, and character based textures. Topics 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 320 Materials and Textures (3 Cr.)

Prerequisite(s): CG 175

This course builds on foundational knowledge from CG 175 and CG 102, delving further into the art and science of painting textures for game characters and environments. Students focus on generating multiple maps for materials to define complex shader properties. Emphasis is placed on effective texture layout and detail for use in games and cinematic applications. Students are also trained on the use of digital sculpting tools that combines 3D/2.5D modeling, texturing, and painting.

CG 340 Game Art Production Tools (3 Cr)

Prerequisite(s): CG 320

This course looks beyond 2D digital painting and 3D animation software to introduce students to specialized modeling, texturing, animation and special effects tools.

CG 350 Graphics for Gaming (3 Cr.)

Prerequisite(s): CG 300

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

CG 360 Lighting and Rendering (3 Cr.)

Prerequisite(s): FLM 350

CG artists must develop strong lighting skills. This course looks at the subject through the world of film cinematography and covers the process of lighting both interior and exterior virtual environments. At the technical and artistic levels, students explore rendering techniques and strategies that efficiently produce a more convincing result.

CG 399 Special Topics in Computer Graphics (3 Cr.)

Prerequisite(s): CG 275

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

CG 400 Advanced 3D Modeling Techniques (3 Cr.)

Prerequisite(s): CG 275

This course focuses on the design and production of highly detailed models for use in feature and broadcast animation. Students use a best-of-breed approach to define their tool set, with particular emphasis placed on organization and structure. Additional emphasis is placed on generating layered digital intermediate files for use in a model-composite workflow in a desktop production environment. Lectures also cover environment and character design research as relevant to detail modeling, presented in a framework of industry-standard geometries and methods. Students also explore advanced material creation using a global illumination-capable rendering engine, incorporating advanced texture creation techniques.

CG 410 Effects Animation (3 Cr.)

Prerequisite(s): CG 360 & FLM 360

This course explores the technical and creative elements required to rig and animate effects. Topics include animating particle effects, fluids, soft and rigid body dynamics. Students are required to integrate the various effects into a live action shot.

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 explore every major movement and genre as well as their impact on society. The course gives students critical vocabulary required for explaining story, animation and cinematic techniques.

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 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 also examine the fundamental theories underlying visual storytelling. Understanding the creative processes utilized by these influential filmmakers provides insight into how students may improve their own animations.

FLM 152 Introduction to Visual Storytelling (3 Cr.)

Prerequisite(s): None

Students review 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 also examine the fundamental theories underlying visual storytelling. Ultimately, students gain insight into effective cinematic sequences. This course is not for BFA, BAGD and BSGD students.

FLM 201 Cinematography (3 Cr.)

Prerequisite(s): FLM 151

Like a filmmaker, computer animators must have a good understanding of appropriate camera composition, lighting and editing 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.. Assignments in camera composition, movement, lighting and editing help students solidify their understanding of the concepts presented.

FLM 210 Cinematography for Visual Effects (3 Cr.)

Prerequisite(s): FLM 151

This course focuses on the technical aspects of cinematography including understanding how cameras work, how images are captured and processed, computer graphics theory, and image analysis. Emphasis is on digital imagery.

FLM 215 Visual Effects Analysis and Process (3 Cr.)

Prerequisite(s): FLM 151

This course explores the history of visual effects in film and how the craft has developed in terms of technology and processes. Students also examine the fundamental production pipeline for the planning and execution of visual effects.

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 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 survey a broad range of music from different cultures. Emphasis is on developing basic listening skills in hearing rhythm, melody, harmony, color, texture, and form. Students then learn how to apply this to the production needs of animation. The course gives 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.

FLM 350 Compositing I (3 Cr.)

Prerequisite(s): CG 201,FLM 210&FLM 215

This course introduces students to two key areas of compositing -- image preparation (eg. rotoscoping, blue/green screen, masks, wire removal) and compositing software (layer-based, node-based). Students apply this knowledge to basic 2D compositing, as well as motion tracking and color correction.

FLM 360 Compositing II (3 Cr.)

Prerequisite(s): CG 275&FLM 350

This advanced compositing course focuses on the integration of 3D elements into live action footage. Concepts covered include image stabilization, lighting, green screen setup and shooting, match moving, camera tracking, and body tracking.

PROJECTS

PRJ 201 2D Animation Production (5 Cr.)

Prerequisite(s): ANI 151 & ART 125

This is a traditional animation course within the context of a two-semester project. This project builds on the cumulative skill sets acquired in ANI 101 and ANI 151, but with a focus on team dynamics, acting, visual storytelling, and the goal of completing a short animated film, rather than a series of learning exercises. PRJ201 concentrates on pre-production for the project.

PRJ 251 2D Vector Animation Production (5 Cr.)

Prerequisite(s): PRJ 201

This is a traditional animation course within the context of a two-semester project. This project builds on the cumulative skill sets acquired in ANI 101 and ANI 151, but with a focus on team dynamics, acting, visual storytelling, and the goal of completing a short animated film, rather than a series of learning exercises. Building on the work completed in PRJ201, PRJ251 concentrates on the production and animation for the project.

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 apply skills learned concurrently in ART 300 and CG 300 to produce an animated short film of limited duration.

PRJ 350 3D Animation Production (5 Cr.)

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

PRJ 350 picks up where PRJ300 left off in further developing design and production skills. The course is a full-semester project where students will produce a short animated production that demonstrates their skills in design, modeling, animation, lighting and rendering.

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 then assign students to specific teams, based upon their artistic strengths and career goals. Wherever possible, individual students are introduced to specialist advisers from outside the faculty.

Each student's individual effort is assessed as well as the overall teamwork and professional success of the team. As in a professional work environment, student teams are not allowed to exclude individual members due to production conflicts or performance. The faculty alone retains 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 then complete final rendering and post-production. Students face the challenges of commercial art direction, quality control, production deadlines, and team dynamics, as well as the many technical challenges.

Department of Game Software, Design and Production

GAME PROJECTS

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 exposes students to the positions and job responsibilities that each member of a game development team has, along with the industry requirements for concept pitches, design documents and schedules. It also introduces sprite animation, object motion, and input processing, which students use in the creation of a game of their own design.

GAM 150 Project I (3 Cr.)

Prerequisite(s): CS 120 & GAM 100

Credit may be received for either GAM 150 or GAM 152, but not for both.

This project focuses on the creation of a simple game or simulation. Students work together on teams of three or four members. All projects must be written entirely in C (C++ is not allowed) and cannot use external libraries or middleware of any kind (except those provided by the instructor). Topics include effective team communication, planning, documentation, debugging, source control, testing, and iterative software development techniques.

GAM 152 Scripting Project (3 Cr.)

Prerequisite(s): CS 116 & GAM 100

Credit may be received for either GAM 150 or GAM 152, but not for both.

This project focuses on the creation of a simple game or simulation. Students work together on teams of three or four members. All proj-

ects are created using a scripting language in a rapid development environment. Topics include effective team communication, planning, documentation, debugging, source control, testing, and iterative software development techniques.

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 or simulation with 2D graphics (3D games are not allowed). Students work together on teams of three or four members to 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++ code and cannot use middleware such as pre-existing physics engines, networking engines, etc. Additional topics may include basic software architecture, essential development practices, fundamentals of team dynamics, and task prioritization methods.

GAM 202 Game Usability and Analysis (1 Cr.)

Prerequisite(s): GAM 150 or GAM 152

This course focuses on assessing and analyzing the usability of games in development. Topics covered may include usability, testing roles, bug reports and regression, player psychology and observation, and measuring subjective experiences. Students run usability sessions as the basis to report on and analyze games from other project classes.

GAM 250 Project II (4 Cr.)

Prerequisite(s): CS 225 & GAM 200

In this class, students work to complete and polish the projects they began in GAM 200. Additional topics may include intermediate

software architecture, advanced debugging techniques, bug tracking, formal playtesting, game pacing, and game balance.

GAM 252 Advanced Usability and Process (1 Cr.)

Prerequisite(s): GAM 202

This course expands on the fundamentals of usability from GAM 202 and covers the full usability and testing process. Topics covered may include functional specifications, test cases, test coverage, build processes, prioritization methods, testing tools, automation, beta tests, internal vs. external testing, localization issues, and certification requirements. Students continue to run usability sessions and write reports on games from other project classes.

GAM 300 Project III (5 Cr.)

Prerequisite(s): CS 200, CS 260, CS 280, GAM 250, & PHY 200

This project is divided into two semesters and focuses on the creation of an advanced real-time game or simulation with hardware-accelerated graphics. Bachelor of Science in Computer Science in Real-Time Interactive Simulation students 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++ code and cannot use middleware, such as pre-existing physics engines, networking engines, etc. Additional topics may include advanced software architecture, 3D art pipelines, building content tools, and advanced team dynamics.

GAM 302 Project for Game Designers (5 Cr.)

Prerequisite(s): GAT 211, either GAM 250 or (GAT 251 & GAM 252)

This project is divided into two semesters and focuses on the design of an advanced real-time game or simulation. Students work in teams either made up only of designers or with students from GAM 300. Designer-only teams can use commercial game engines, middleware,

or other libraries that teams with GAM 300 students cannot. Additional topics may include online portfolios, effective presentations, managing scope, and advanced team dynamics.

GAM 350 Project III (5 Cr.)

Prerequisite(s): GAM 300

In this class, students work to complete the projects they began in GAM 300. Additional topics may include large project software architecture, advanced testing techniques, internships, and an introduction to resumes and interviews.

GAM 352 Project for Game Designers (5 Cr.)

Prerequisite(s): GAM 302

In this class, students work to complete the projects they began in GAM 302. Additional topics may include large project design, advanced testing techniques, internships, and an introduction to resumes and interviews.

GAM 375 Advanced Project (5 Cr.)

Prerequisite(s): GAM 350 or GAM 352

In this course, individual students work to create a highly polished advanced technology demonstration or design project. With instructor approval, students could instead polish an exceptional project from a previous class to a higher standard. Topics may include advanced user interfaces and controls, advanced special effects, advanced behaviors, and creating effective demonstrations.

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

Prerequisite(s): GAM 250 or GAT 251

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 structured along the Internship Guidelines available in the Administration Office.

GAM 400 Project IV (5 Cr.)

Prerequisite(s): GAM 350 & CS 250 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, commercial physics engines, commercial game engines, hands-free input devices, etc. These technologies can be used to implement technical features, such as 3D animation, advanced lighting and rendering, advanced 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 work independently or in teams, as appropriate to the scope of their project. Additional topics may include advanced interviewing techniques and writing effective resumes.

GAM 450 Project IV (5 Cr.)

Prerequisite(s): GAM 400

In this class, students work to complete the projects they began in GAM 400. Additional topics may include working in the industry, personal networking, and career strategies.

GAME APPLICATION TECHNIQUES

GAT 110 Game History (3 Cr.)

Prerequisite(s): None

This course covers the history of games from the very first games of ancient civilizations, to traditional tabletop games, to classic video games from the 20th century. Top-

ics may include how the core mechanics of even the oldest games are still present in video games today, how games can be categorized by their core mechanics, and how social forces and technology drive changes in the games we play. Students are required to play, analyze, and modify a wide variety of games as the primary coursework of this class.

GAT 210 Game Mechanics I (3 Cr.)

Prerequisite(s): GAT 110, MAT 103 or MAT 140

In this course, students start building a foundational knowledge of game mechanics by creating, analyzing, and testing non-digital dice, card, and board games of their own design. Topics may include randomness, game state, hidden information, position, designing to a specification, writing rules, and playtesting.

GAT 211 Game Mechanics II (3 Cr.)

Prerequisite(s): GAT 210

This course focuses on how to create the maps, characters, and combat systems needed for combat-oriented games. Students work to create a large variety of maps, create new character types for existing games, convert specific video games into tabletop games, and build a tabletop combat-oriented game of their own design. Topics may include map types and layouts, movement, visibility, force composition, character statistics and roles, melee combat, ranged combat, damage, armor and health.

GAT 212 Advanced Game Mechanics (3 Cr.)

Prerequisite(s): GAT 211

This course focuses on the design of non-digital role-playing games and a variety of non-digital simulation games. Students work to create an original small role-playing game, a simulation game of their choice, and an additional non-digital game of any kind. Topics may include skill systems, character advancement, equipment variety,

realistic combat, strategic simulations, supply systems, economic simulations, vehicle simulations, and sport simulations.

GAT 240 Technology for Designers (3 Cr.)

Prerequisite(s): CS 176 or CS 225, PHY 115 or PHY 200

This course is a survey of the technologies commonly used in game development. Topics may include spreadsheets, file formats, lighting, shaders, art pipelines, networking, databases, physics engines, audio engines, and artificial intelligence. These topics are covered only at a basic level—enough to be able to use them as a designer, but not enough to be able to implement them.

GAT 250 2D Game Design I (3 Cr.)

Prerequisite(s): GAT 210, PSY 101, CS 170 or CS 175

Credit may be received for either GAT 250 or for GAT 305, but not for both.

This course focuses on designing and implementing games using a 2D engine. Students work to create several original games in common genres, such as platformers, shooters, brawlers, or puzzle games. Topics may include aesthetics, level construction, enemy placement, resource placement, player guidance, player controls, scripting, and game mechanics in 2D.

GAT 251 2D Game Design II (3 Cr.)

Prerequisite(s): GAT 250 & GAT 211

This course focuses on designing and implementing some of the more complicated types of 2D games, such as role-playing games, strategy games, or economic games. Students work to create several original games in these genres, including one in the genre of their choice. Topics may include character advancement, inventory, strategic balance, diplomacy, trading, and real-time economic systems.

GAT 305 2D Level Design (3 Cr.)

Prerequisite(s): CS 170 or CS 175

Credit may be received for either GAT 305 or for GAT 250, but not for both.

This course is an introduction to level design, focused on how design decisions determine the player experience. Students work to create fully functional levels for one or more professional games. Games used may include any level-centric game with 2D gameplay, such as traditional platformers, real-time strategy games, top-down shooters or brawlers, or isometric RPGs. Topics may include level layout, enemy placement, resource placement, player guidance, and pacing.

GAT 310 3D Level Design (3 Cr.)

Prerequisite(s): GAT 305 or GAT 250

Credit may be received for either GAT 310 or for GAT 315, but not for both.

This course is an introduction to level design for 3D games, focusing on the unique design challenges of a 3D environment. Students will work to create fully functional levels for one or more professional games. Games used may include any level-centric game with 3D gameplay, such as first-person shooters, third-person platformers, third-person adventure games or RPGs, or 3D racing games. Topics may include environment building, lighting, texturing, player guidance, and camera controls.

GAT 315 3D Game Design I (3 Cr.)

Prerequisite(s): ART 310 & GAT 251

Credit may be received for either GAT 315 or for GAT 310, but not for both.

This course focuses on designing and implementing games using a 3D engine. Students will work to create one or more levels from start to finish, including any needed modifications to game mechanics, controls, and cameras. Topics may include aesthetics, environment

building, lighting, texturing, resource placement, player guidance, player controls, camera controls, scripting, and game mechanics in 3D.

GAT 316 3D Game Design II (3 Cr.)

Prerequisite(s): GAT 315

This course focuses on designing and implementing 3D games in specific genres, such as first-person shooters, adventure games, role-playing games, platformers, or real-time strategy games. Students work to create an original prototype for each genre covered using a 3D engine of the appropriate type. Topics may include puzzle design, platforming design, boss fight design, cover mechanics, and terrain modification for a 3D game.

GAT 330 Interactive Narrative and Character Creation for Games (3 Cr.)

Prerequisite(s): ENG 120 & GAT 251

This course focuses on how to write stories that integrate with gameplay and mechanics. From creating characters to writing branching and interactive dialogue, students work on storytelling in various genres by incorporating their stories and characters into an existing game engine. Topics may include the design and structure of dialogue trees, creating mood parameters for dialogue choices, interactive narrative, autonomous behaviors, emergent gameplay, adding emotional depth through the use of character archetypes, and weaving theme and story into the game in a way that resonates with the player.

GAT 335 Serious Games (3 Cr.)

Prerequisite(s): GAM 250 or GAT 251

This course focuses on games and simulations that do not have entertainment as their primary purpose. Topics may include military training, medical training, employee training, skill training, safety training, emergency response training, educational games, advocacy

games, therapeutic games, exercise games, scientific simulations, optimization simulations, and planning simulations.

GAT 399 Special Topics in Game Development (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course may 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 401 Rapid Prototyping (3 Cr.)

Prerequisite(s): CS 225 or CS 176

This course introduces students to high-level tools for rapid prototyping of creative, interactive, multimedia experiences, using current technologies for making small, portable games. The design, development, and iterative processes commonly used for developing web-based game applications and other multimedia presentations are also covered.

GAT 405 Advanced Game Design (3 Cr.)

Prerequisite(s): GAT 251

This course focuses on one or more advanced game design topics based on the expertise of the instructor. Topics may include art games, music games, social games, educational games, serious games, handheld games, alternative input games, radically innovative games, and more. Students work to create one or more prototypes of a game in the areas being covered, either individually or in teams, as appropriate. Emphasis is heavily placed on innovation and students are encouraged to challenge their assumptions about what games are and what games can be.

GAT 480 Senior Portfolio (1 Cr.)

Prerequisite(s): GAM 350 or GAM 352

This one-credit course covers advanced portfolio development. Students work to organize and present their work in online, paper, and electronic media in a professional form. Topics may include targeted resumes, non-standard cover letters, advanced interviewing techniques, interactive portfolios, and voice-over videos.

Department of Humanities and Social Sciences

COMMUNICATIONS

COM 150 Interpersonal and Work Communication (3 Cr.)

Prerequisite(s): ENG 110

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

ECONOMICS

ECN 350 Engineering Economics (3 Cr.)

Prerequisite(s): None

This course gives students a sound basis for making economic decisions in business and industry environments. Students learn how to decide which projects are worthwhile, determine priorities, and select components. Topics in this course include present worth, future amounts, cash flows, salvage value, depreciation, rates of return, income tax, basic cost accounting, and funding sources,

including venture capital and SBIR. The course also covers the basics of intellectual property, patents, and copyright.

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 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 emphasizes using writing as a tool to explore and discover their thought processes, beliefs, and world concepts. Students 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 become conscious of the concepts which have shaped and are continually shaping their personal realities.

ENG 116 Storytelling (4 Cr.)

Prerequisite(s): None

Storytelling is one of the oldest art forms, yet narrative— the description of an event—is also one of the most complex human endeavors. The art of narrative is endless, and we have created an almost boundless number of forms for telling stories: gesture, speech, writing, painting, photography, cinema, television, comics, newspapers, music, theater, and video games. Contemporary narrative strategies and structures share much in common with the most archaic of storytelling traditions. This course begins by investigating the psychosocial drive to tell stories, and proceeds to examine how the principal elements of narrative assert themselves in a variety of narrative genres and across different media.

Students explore the rhetoric of narrative in its many guises, and gain an appreciation for both classical and contemporary formulations of story structure. In particular, this course focuses on how narrative may be adapted across media and genres. A series of written assignments focuses on the demands of storytelling made by different genres. Such a study discloses the particular attributes of each genre, and exposes the inextricable bond between narrative form and narrative content. Additionally, the class considers several ways to interpret narrative, negotiate the temporal restrictions of commercial storytelling applications, and begin to think about the ethics of storytelling.

ENG 120 Research, Reasoning, and Writing (3 Cr.)

Prerequisite(s): ENG 110

In this composition course, students practice advanced argumentative essay writing with a focus on research, critical analysis of the research, thesis presentation, and defense. During the semester students write several research essays on various topics using both traditional and new information technologies.

ENG 150 Mythology (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 provides 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 examines the practical use of myth. Additionally, it emphasizes 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 242 - Multicultural Literature (3 Cr.)

Prerequisite(s): ENG 110 & ENG 150

This course explores what modernity and post-modernity have or have not meant to American writers whose histories and cultures are not European in origin but whose writings are steeped in European- American literary traditions. The course explores the cultural hybridism of this literature as well the unique visions of the world they have created. These funny, humorous, bitterly satirical, and downright serious (post)- modern fantasies are quintessentially American, yet also unique and peculiar to these authors' ethnic experiences. The selected works also offer an opportunity to read or re-read well established and newer American works of literature

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 gain in-depth knowledge of the form and apply this experience by adapting the epic's themes and structures into their own creative endeavors, including video games. Students 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 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 gain the insights and skills they need to write compelling fiction of their own. Students complete weekly writing assignments, as well as two full-length short stories. In addition, students learn how to give and receive constructive criticism regarding their creative work. Although the focus is on the form of the short story, there are also discussions on how narrative is employed in graphic storytelling and video games. By the end of the course, students gain confidence in their ability to analyze, to discuss, and to write short stories. They acquire a deeper understanding of the creative process, particularly as it applies to writing.

ENG 246 American Ethnic Literatures (3 Cr.)

Prerequisite(s): ENG 110

This course is an opportunity for students to discover and follow the development of American ethnic literatures, such as Native American, African American, Asian American, and Chicano/Latino literatures from the late 18th century to the early 21st century. Texts include classics as well as recent texts that explore contemporary issues and employ modern and post-modern literary techniques.

The course explores the cultural hybridism of this literature as well as the unique visions of the worlds created by these authors. Their narratives are quintessentially American, yet also unique and peculiar to these authors' ethnic experiences.

ENG 315 Story through Dialogue (4 Cr.)

Prerequisite(s): ENG 116

Dialogue is more than just what people say; dialogue is a crucial element that animates contemporary narrative genres, including fiction, graphic novels, film and television, drama, and even video games. Through an intensive reading of fiction and critical texts, film screenings, written and oral exercises, and a series of workshops, this course aims to provide students with an introduction to the centrality of dialogue in a variety of narrative genres. One central aim of this course is to identify the characteristics of effective dialogue and the role dialogue plays in crafting action, characterization, and theme in different narrative modes. Students are also coached to consider reading texts or viewing films as a dialogic exercise—a give and take between reader/viewer and text. Additionally, students learn traditional dialogue and scripting formats and utilize them in their written work, with the eventual goal of producing a pre-production script proposal. This course offers students an opportunity to participate in a hybrid literature-writing class that provides the invaluable experience of reading closely, writing often, and reflecting upon their work in a supportive environment.

ENG 340 Creative Writing across the Arts (3 Cr.)

Prerequisite(s): ENG 110 or ENG 116

This course focuses on the generation of creative writing in multiple genres and media, including poetry, fiction, creative non-fiction, and graphic novels. Students study and practice writing in a workshop atmosphere and engage in intensive reading of excellent writings, most of which employ interdisciplinary, cross-genre approaches that encompass painting, photography, and other visual art. Discussions of readings are followed by writing experiments designed to spark original thinking, to develop facility with writing, and to enhance understanding of the creative

process. Students gain in-depth knowledge of the possibilities of creative writing and apply this experience by writing both short creative pieces and longer works.

ENG 399 Special Topics in English (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course may 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 400 Creative Writing for Game Design (3 Cr.)

Prerequisite(s): ENG 110 or ENG 150

This course focuses on the narrative elements of creative writing. Exercises generate thinking and hone students' basic storytelling talents, including characterization, exposition, plot, conflict, back-story, dialogue, and appropriate use of language. Students learn how to use symbols to design a story and how to manipulate the symbols to create character, plot, message, and interactivity. Students are encouraged to access their own genius, culture, and life experience in the development of their stories.

ENG 410 Interactive Storytelling (3 Cr.)

Prerequisite(s): ENG 110

In this class, students learn to design stories with symbolic language. Exercises help students apply and understand character design and development, archetypes, conflict, plot patterns, back-story, dialogue, exposition, premise, and the psychological dynamics of human choice. Students also learn how to manipulate symbols in images by drawing from a variety of theoretical models, such as Carl Jung's dream analysis, personality profiling per Myers-Briggs, Gestalt psychology, and narrative architecture.

ENG 420 Cybertexts: Interactive Media and the Future of Narrative (3 Cr.)

Prerequisite(s): ENG 110 or ENG 150, Equivalent, or Permission of instructor

Video games and other forms of interactive media are widely touted as the future of both popular entertainment and narrative storytelling. If video games and other interactive media are developing into art forms, then we can expect that these emerging narrative forms will be able to accommodate genres of storytelling that have existed since time immemorial, including romance, comedy, tragedy and epic. Yet the dynamics of nonlinear storytelling, the limits of current video game technology, and the constraints of the marketplace do not seem conducive to expanding the narrative elements of interactive media. This course traces the boundaries between narratives and games, and aims to identify areas of overlap that can lead to the development of new expressions of narrativity in interactive media. One central goal of the course is to grapple with the problem(s) posed by interactive narrative.

Assigned readings examine the difference between traditional narrative texts and texts that require a higher degree of interactivity, collectively called cybertexts. The goal of the course is to identify what differences may exist, and to analyze the possibilities for adapting traditional narrative into interactive media. This class's central innovation requires students to actively adapt an element of traditional narrative into a cybertext. By the end of the class, students reach a conclusion, based on their reading and course work, as to whether cybertexts can effectively encompass traditional narrative genres, and if not, whether this is due to limitations of the form, or the limitations of technology

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 write three full-length short stories and read contemporary fiction by established authors not discussed in previous courses. Enrollment is limited to a maximum of 12 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 review and define interactive media using examples drawn from academic research, film, television, and games. Students 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 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 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.

JAPANESE

JPN 101 Introduction to Japanese I (3 Cr.)

Prerequisite(s): None

This course is designed for students with little or no background in Japanese. The course presents the basics of pronunciation, orthography, speaking, listening comprehension, reading, writing, and the sociolinguistics of modern Japanese. This course emphasizes acquiring the ability to communicate and function accurately and appropriately in both speaking and writing Japanese.

JPN 102 Japanese II (3 Cr.)

Prerequisite(s): JPN 101

This course is designed for students who have taken JPN 101. The pace of JPN 102 is slightly faster than JPN 101. JPN 102 emphasizes acquiring the ability to communicate and function in Japanese accurately and appropriately, both in speech and in writing. By the end of the course, students are able to speak, understand, read, and write Japanese on a limited variety of topics.

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 learn fundamental issues surrounding this field, such as fair use, international relations, and economics. The course also introduces students to a basic overview of contracts, including structure, traditions, and vocabulary.

MANAGEMENT

MGT 451 Project Management (3 Cr.)

Prerequisite(s): None

This course provides in-depth examination of theories, techniques, and issues in project management. It covers various aspects of project management including team leadership, marketing, budgeting, long-range project planning, contract negotiations, and intellectual property considerations. The course includes exercises that give students insight into dealing with product conceptualization, team effectiveness and performance issues.

PHILOSOPHY

PHL 150 Introduction to Philosophy (3 Cr.)

Prerequisite(s): ENG 110

This course introduces 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 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 may 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 are also 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 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 examine how technology influences and is influenced by values and cultures in America and abroad. The course helps 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 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 also uses an historical approach to address some of the technological innovations that have most affected U.S. society in the past. The course considers 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 used 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. It begins with an overview of definitions of race, gender, and ethnicity, exploring what they have meant in the past and what they mean now. Then the course examines 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 may 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 examine neurophysiology, perceptual psychology, and artistic traditions. The course gives 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 learn to identify skeletal and muscular forms from both live models and anatomical references. Additionally, students consider terminology, structural arrangement, and kinetic function. The course gives 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 extrapolate their knowledge of the human form to the structure and form of a variety of animal types, specifically focusing on the impact of locomotion and feeding strategies on form. Additionally, students consider terminology, structural arrangement, and kinetic function. The course also considers standard locomotion cycles and the relationship between humans and various animals. It gives special emphasis to adapting this knowledge to the needs of artists and animators.

BIO 225 Animal Motion: Sequential Limb Movement (3 Cr.)

Prerequisite(s): None

This course introduces the major locomotion cycles with the associated skeletal and muscular structures of animals in motion. Students compare the moving bipedal, human-like form to the structure and form of a variety of animal types. Special emphasis is placed on the impact of locomotion on form. Vocabulary, structural arrangement, and kinetic function are all considered. The course also considers standard locomotion cycles of humans and various animals. Special emphasis is given to adapting this knowledge to the needs of artists and animators.

BIO 399 Special Topics in Biology (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course may 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 Mathematics

MATH

MAT 103 Precalculus with Discreet Mathematics (4 Cr.)

Prerequisite(s): None

This course presents a review of college algebra and trigonometry, and an introduction to discrete mathematics. The most basic part covers a review of functions and their graphs. The introduction to discrete mathematics includes basic counting and finite probabilities. Topics may include polynomial, rational, trigonometric, exponential and logarithmic functions of a real variable. Other topics include systems of equations and conic sections.

MAT 140 Linear Algebra and Geometry (4 Cr.)

Prerequisite(s): None

Credit may be received for either MAT 103 or MAT 140, but not for both.

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 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.

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

Prerequisite(s): None

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 180 Vector Calculus I (4 Cr.)

Prerequisite(s): MAT 140 & Prior calculus experience

Credit may be received for either MAT 150 or MAT 180, but not for both

This course extends the standard calculus of one-variable functions to multi-variable vector-valued functions. Vector calculus is used in many branches of physics, engineering, and science, with applications that include dynamics, fluid mechanics, electromagnetism, and the study of curves and surfaces. Topics covered include limits, continuity, and differentiability of functions of several variables, partial derivatives, extrema of multi-variable functions, vector fields, gradient, divergence, curl, Laplacian, and applications.

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 225 Calculus and Analytic Geometry III (3 Cr.)

Prerequisite(s): MAT 200 or MAT 230

This course extends the basic ideas of calculus to the context of functions of several variables and vector-valued functions. Topics include partial derivatives, tangent planes, and Lagrange multipliers. The study of curves in two- and three-space focuses on curvature, torsion, and the TNB-frame. Topics in vector analysis include multiple integrals, vector fields, Green's Theorem, the Divergence Theorem and Stokes' Theorem. Additionally, the course may cover the basics of differential equations.

MAT 230 Vector Calculus II (4 Cr.)

Prerequisite(s): MAT 180

Credit may be received for either MAT 200 or MAT 230 but not for both.

This course is a continuation of MAT 180. Topics covered include differential operators on vector fields, multiple integrals, line integrals, general change of variable formulas, Jacobi matrix, surface integrals, and various applications. The course also covers the theorems of Green, Gauss, and Stokes.

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 course emphasizes 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 290 Linear Algebra and Geometry of Curves (3 Cr.)

Prerequisite(s): MAT 200 or MAT 230

Credit may be received for only one of MAT 290, MAT 250, or MAT 300

This course combines material from MAT 250 and MAT 300 into a single course. Topics from linear algebra include vector spaces, linear transformations, change of basis, function spaces, and

piecewise polynomials. Topics from geometry include Bezier curves, splines, interpolation, and constructive curves and surfaces.

MAT 300 Curves and Surfaces (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course is an introduction to parameterized polynomial curves and surfaces with a view toward applications in computer graphics. It discusses 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 350 Advanced Curves and Surfaces (3 Cr.)

Prerequisite(s): MAT 300

This course is a continuation of MAT 300 with topics taken from the theory and applications of curves and surfaces. The course treats some of the material from MAT 300 in more detail, like the mathematical foundations for non-uniform rational B-spline (NURBS) curves and surfaces, knot insertion,

and subdivision. Other topics may include basic differential geometry of curves and surfaces, tensor product surfaces, and multivariate splines.

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

Prerequisite(s): MAT 300

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 352 Wavelets (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course presents the foundations of wavelets as a method of representing and approximating functions. It discusses background material in complex linear algebra and Fourier analysis. Basic material on the discrete and continuous wavelet transforms forms the core subject matter. This includes the Haar transform, and multi-resolution analysis. Other topics may include subdivision curves and surfaces, and B-spline wavelets. Applications to computer graphics may include image editing, compression, surface reconstruction from contours, and fast methods of solving 3D simulation problems.

MAT 353 Differential Geometry (3 Cr.)

Prerequisite(s): MAT 300

This course presents an introduction to differential geometry, with emphasis on curves and surfaces in three-space. It includes background material on the differentiability of multivariable functions. Topics covered include parameterized curves and surfaces in three-space and their associated first and second fundamental forms, Gaussian curvature, the Gauss map, and

an introduction to the intrinsic geometry of surfaces. Other topics may include an introduction to differentiable manifolds, Riemannian geometry, and the curvature tensor.

MAT 354 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 explore various data structures and algorithms. The analysis of these algorithms, focusing specifically on the mathematics that arises in their development and analysis is discussed. Although CS 330 is not a prerequisite, it is recommended.

MAT 355 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 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 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 359 Computational Algebraic Geometry (3 Cr.)

Prerequisite(s): MAT 300

This course introduces computational algebra as a tool to study the geometry of curves and surfaces in affine and projective space. The central objects of study are affine varieties and polynomial ideals, and the algebra-geometry dictionary captures relations between these two objects. The precise methods of studying polynomial ideals make use of monomial orderings, Grobner bases, and the Buchberger algorithm. Students have opportunities to program parts of these algorithms and to use software packages to illustrate key concepts. Further topics may include resultants, Zariski closure of algebraic sets, intersections of curves and surfaces, and multivariate polynomial splines.

MAT 361 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 are covered, are divisibility and congruence, Euler's function, Fermat's little theorem, Euler's formula, the Chinese remainder theorem, powers modulo m, k^{th} roots modulo m, primitive roots and indices, and quadratic reciprocity. These tools are then used in cryptography, where the course discusses encryption schemes, the role of prime numbers, security and factorization, the DES algorithm, public key encryption, and various other topics, as time allows.

MAT 364 Combinatorial Game Theory (3 Cr.)

Prerequisite(s): MAT 258

Combinatorial Game Theory studies finite, two-player games in which there are no ties. Techniques from logic combinatorics and set theory are used to prove various properties of such games. Typical games include *Domineering, Hackenbush,* and *Nim.* The analysis of such games can also be used to study other more complex games like *Dots* and *Boxes*, and *Go.* Topics covered in this course include Conway's theory of numbers as games, impartial and partizan games, winning strategies, outcome classes and algebra of games.

MAT 365 Introduction to Topology (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course introduces topology and its applications. Topics covered include topological spaces, quotient and product spaces, metric and normed spaces, connectedness, compactness, and separation axioms. Further topics may include basic algebraic topology, fixed point theorems, theory of knots, and applications to kinematics, game theory, and computer graphics.

MAT 399 Special Topics in Mathematics (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course may 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.

MAT 400 Introductory Analysis I (3 Cr.)

Prerequisite(s): MAT 250

This course introduces the foundations of real analysis by means of a rigorous reexamination of the topics covered in elementary calculus. The course starts with the topology of the real line and proceeds to a formal examination of limits, continuity, and differentiability. The course also covers the convergence of sequences and series of real numbers and the uniform convergence of sequences of real valued functions.

MAT 410 Introductory Analysis II (3 Cr.)

Prerequisite(s): MAT 400

A continuation of MAT 400, this course emphasizes the formal treatment of the theory of integration of functions of a real variable. It reexamines the Riemann integral and the Fundamental theorem of calculus as well as the theory of the Stieltjes and Lebesgue integral and their applications in probability and Fourier analysis. The course concludes with a discussion of the topology of R^n, and the differentiability and integrability of functions of several variables, including the theorems of Green and Stokes and the divergence theorem.

MAT 450 Abstract Algebra I (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course provides an introduction to the foundations of abstract algebra. The fundamental objects of study are groups, rings, and

fields. The student builds on previous courses in algebra, particularly linear algebra, with an even greater emphasis here on proofs. The study of groups is an ideal starting point, with few axioms but a rich landscape of examples and theorems, including matrix groups, homomorphism theorems, group actions, symmetry, and quotient groups. This course extends these ideas to the study of rings and fields. Topics in ring theory include polynomial rings and ideals in rings. The course also covers fields, their construction from rings, finite fields, basic theory of equations, and Galois theory.

MAT 460 Abstract Algebra II (3 Cr.)

Prerequisite(s): MAT 400

This course builds on the foundations established in MAT 450. It extends the fundamental objects of groups, rings, and fields to include modules over rings and algebras. The course gives the basic ideas of linear algebra a more rigorous treatment and extends scalars to elements in a commutative ring. In this context, students study the general theory of vector spaces and similarity of transformations. The curriculum also discusses non-commutative algebras and rings, emphasizing examples, such as quaternion algebras. Further topics may include non-associative rings and algebras, Galois theory, exact sequences, and homology.

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 explore geometry, trigonometry for cyclical motions, and physical equations of motion for bodies moving under the influence of forces. With these tools, students 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 learn the laws that govern the mechanical world and how to use these laws to form a simulated world. They examine the concepts involved with kinematics, Newtonian dynamics, work and energy, momentum, rotational motion, and statics.

PHY 200L Motion Dynamics Laboratory (1 Cr.)

Concurrent Course(s): PHY 200

This course presents the concepts of PHY 200 in the laboratory. The experiments allow students to experience the laws of basic physics involving linear motion, force, gravitation, conservation of energy, conservation of momentum, collisions, rotational motion, and springs. Error analysis and data reduction techniques are taught and required in experimental reports.

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 are able to implement ray casting and ray tracing algorithms, as well as create realistic flight simulators, lens effects, and many-body simulations.

PHY 250L Waves, Optics, and Thermodynamics Laboratory (1 Cr.)

Concurrent Course(s): PHY 250

This course presents the concepts of PHY 250 in the laboratory. The experiments allow students to experience the physical laws involving oscillations, waves, sound, interference, lift, drag, heat, optics, and entropy. Extended error analysis and statistics are taught and required in experimental reports.

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 270L Electricity and Magnetism Laboratory (1 Cr.)

Concurrent Course(s): PHY 270

This course presents the concepts of PHY 270 in the laboratory. The experiments allow students to experience the physical laws involving electric fields, electric potential, electric current, electric charge, capacitance, current, resistance, inductance, circuits, and magnetism. Error analysis and statistics are taught and required in experimental reports.

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 course is a calculus based scientific examination of topics from general relativity and quantum mechanics through nuclear physics, high-energy physics, and astrophysics.

PHY 290L Modern Physics Laboratory (1 Cr.)

Concurrent Course(s): PHY 290

This course presents the concepts of PHY 290 in the laboratory. The experiments allow students to experience the discoveries of the last 100 years. The Michelson-Morley interferometer, the photoelectric effect, the electron's charge to mass ratio, the Franck-Hertz experiments, electron diffraction and the thermal band-gap. Error analysis and statistics are taught and required in experimental reports.

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 provides the basis for the understanding of linear and rotational systems. The combination of theoretical physics and numerical methods 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 & PHY 300

In this course, students gather into teams of two to three and create a physics engine with minimal interface and graphics. Weekly lectures 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

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