College Curriculum Proposal Approval and Routing Form

TITLE OF PROPOSAL: Bachelor of Science, Major in Computer Science

Bachelor of Science, Major in Computer Science Game Programming Track

Originating Faculty:＿＿＿ Ralph P. Tucci, Scott McDermott ＿＿＿＿＿＿＿＿＿＿＿＿＿

Department/College:＿＿＿ Mathematical Sciences ＿＿＿＿＿＿＿ Chairperson: ＿Ralph P. Tucci＿＿＿＿＿

Contact Phone/Email:＿＿＿ Ralph P. Tucci, x2663, tucci@loyno.edu ＿＿＿＿＿＿＿＿＿＿＿＿＿

Type of Proposal (Check all that apply):

New Major[1] XX ＿ New Minor＿＿＿＿ New Concentration XX ＿ Revise Existing Program＿＿＿＿＿＿

New Course＿＿＿＿＿ Change to Existing Course ＿＿＿＿＿ Discontinue Program ＿＿＿＿＿

Undergraduate XX ＿ Graduate ＿＿ Online ＿＿ Professional & Cont. Studies ＿＿ Other ＿＿＿＿＿

1. **Resources and Fees:**
   If this is a proposed revision, are there existing fees?　　　　 No＿ X ＿ Yes＿＿＿＿ $＿＿＿＿
   Will course or program fees be required for this course/program?　 No＿ X ＿ Yes＿＿＿ $＿＿＿
   Are new resources needed for implementing this proposal?　 No＿ X ＿ Yes＿＿＿＿
   If yes, include complete description and dollar amount in proposal.

2. **College Review and Approvals:**

   a. Department/School＿＿ *Ralph P. Tucci* ＿＿＿＿＿＿＿＿＿ (Chair)Date: **10/13/16**
   　　　Approved **x** ＿ Not Approved ＿＿＿＿

   b. College Curriculum Committee＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿(Chair) Date: ＿＿＿＿＿
   　　　Approved ＿＿＿＿ Not Approved ＿＿＿＿

   c. College Dean ＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿ Date: ＿＿＿＿
   　　　Supported ＿＿＿＿ Not Supported ＿＿＿＿

3. **Intercollegiate Review and Recommendations Required as applicable to proposal:**

   a. Online Education Committee＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿(Chair) Date:＿＿＿＿
   　　　Recommended ＿＿＿ Not Recommended ＿＿＿＿

   b. Professional and Continuing Studies Committee＿＿＿＿＿＿＿＿＿ (Chair) Date:＿＿＿＿
   　　　Recommended ＿＿＿ Not Recommended ＿＿＿＿

   c. Graduate Council ＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿(Chair) Date: ＿＿＿＿
   　　　Recommended ＿＿＿ Not Recommended ＿＿＿＿

4. **University[2] Recommendations Required as applicable to proposal:**

   a. University Courses & Curriculum Committee＿＿＿＿＿＿＿＿＿＿(Chair) Date: ＿＿＿＿
   　　　Recommended ＿＿＿ Not Recommended ＿＿＿＿

   b. Standing Council for Academic Planning ＿＿＿＿＿＿＿＿＿＿＿(Chair) Date: ＿＿＿＿
   　　　Recommended ＿＿＿ Not Recommended ＿＿＿＿

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[1] New Degree to be Offered—**Requires SACS Notification 6 Months Prior to Start**

2 Approval by the Strategic Planning Team, University Budget Committee, and/or Board of Trustees may be required for proposals that have significant impact on resources or mission. Proposals to establish or discontinue degree programs require approval by Board of Trustees and SACS.

UC&CC approved 11/29/2012

COLLEGE PROGRAM PROPOSAL FORM

Instructions: Use this form for all single discipline program proposals. Use the Interdisciplinary Program Proposal Form for interdisciplinary program proposals.

Title of Program: __Bachelor of Science, Major in Computer Science_____

   __Bachelor of Science, Major in Computer Science Game Programming Track___

Originating Faculty Member: __Ralph P. Tucci, Scott McDermott_____

Department: __Mathematical Sciences_____ Chairperson: __Ralph P. Tucci_____

Contact Phone and Email: _____Ralph P. Tucci, x2663, tucci@loyno.edu_____

This is a __XX___ new program _____modification of existing program requirements.

Summary Description of Proposal:

The creation of a Bachelor of Science degree in Computer Science (hereinafter referred to as COSC) is proposed to revive a vital and vibrant degree program that was beneficial to the Loyola community and our graduates. The creation of a Bachelor of Science degree in Computer Science with a Game Programming Track (hereinafter referred to as CSGP) enhances this degree by allowing students to focus on skills pursuant to employment in the ever growing gaming industry. The proposed COSC degree would consist of 36 credit hours of required coursework in the major area of Computer Science, a 5-credit hour practicum or internship requirement, and 10 additional credits of adjunct Mathematics coursework. The proposed CSGP track degree would consist of 27 credit hours of required coursework in the major area of Computer Science, 9-credit hours of applied coursework in selected supporting areas appropriate to game programming, a 5-credit hour practicum or internship requirement in the gaming industry, a 3 credit Capstone experience, and 6 to 7 additional credits of adjunct Mathematics coursework.

This proposal complements the existing Bachelor of Science degree in Computer Information Systems (hereinafter referred to as CIS), allowing students to refine programming skills and Computer Science knowledge.

Please see the DPCL's for more detail.

Proposals for programs will be reviewed using the following criteria. The order of the criteria does not imply any ranking of the various items. While all criteria may not be satisfied, all criteria must be addressed in a proposal.

I.   **Brief Background of the Program Development**
      Provide a brief overview of the background and significance or foundation that influenced the development of the program.

Loyola offered both a Computer Science and a Computer Information Systems degree through the College of Arts and Sciences and City College until 2005. The College of Arts and Sciences currently offers a degree in Computational Mathematics and an interdisciplinary Computational Science minor, each of which has an emphasis on computing. The College also recently added a Computer Science minor and a Computer Information Systems major to respond to student needs in this technical area. Existing Computer Science courses offered in the College would be leveraged for the proposed COSC and CSGP degrees.

The structure of the proposed degrees in COSC and CSGP is consistent with previous Loyola offerings under the BS in Computer Science designation. Improving on the original COSC degree, the new COSC and CSGP degrees have been updated to address evolving technologies, and to fit the university's standard 120-credit curriculum.

The proposed COSC and CSGP degrees differ from the previous incarnation of the COSC degree in that we have included 5 credit hours of internships. The CSGP degree also includes a capstone course that allows students to further refine their game programming experience.

II.   **Description of the Program**
      Please organize the proposal utilizing the headings below. The text within each heading can be modified to better meet unit needs/dimensions.

      1.   **Mission**
            Describe the ways in which the program responds directly or indirectly to the mission of the unit (e.g., department, division, college) and the university.

The discipline of Computer Science prepares graduates for meaningful lives of service in fulfilling professional positions. Every industry is impacted by the continually accelerating growth of technology, and students in computer and technology majors are no longer faced with the prospect of only working in narrowly defined technological occupations. Rather, students have the opportunity for employment in diverse fields ranging from public service to non-profit work, and from traditional business to entrepreneurship and innovation.

The proposed COSC and CSGP degrees both provide a solid background in Computer Science. The proposed CSGP degree further provides students with the experience and knowledge base essential for employment in the game programming industry. All game companies train their new COSC hires; the CSGP degree will give our graduates a head start in training.

2. **Alignment with the College and University Strategic Plan**
Describe ways in which the proposed program aligns with and will contribute to the unit (e.g., department, division, college) and University's strategic plans.

The proposed degrees in COSC and CSGP represent a commitment to preparing students for a dynamic, high-growth field with a growing presence in New Orleans. The proposed CSGP degree, particularly, has the potential to become a signature degree for the University and the College of Arts and Sciences in that it is a technical AND scientific--a draw for entering students.

3. **Projected Demand**
    a. Evidence, quantitative and qualitative data, regarding the potential demand for the proposed program, based on internal information and/or comparisons with peer programs (e.g., informed opinion and source, data-driven from published reports, anecdotal information)

Current students and prospective students have expressed considerable interest in the proposed COSC and CSGP degrees. We anticipate more interest among current and prospective students if these programs are approved.

At the Fall 2016 Open House several potential students indicated they are now more seriously considering Loyola directly because of the possible new COSC and CSGP degree offerings.

During the current academic year 2016-2017 the Mathematics program had 9 new freshmen entering as Mathematics majors. This is more than double the number of students entering the Mathematics program in previous years. Since the only notable change in the department was the addition of the CIS degree, it is reasonable to assume that the increase is tied to having a CIS program. Having the proposed COSC and CSGP degrees should only strengthen this trend. These new degrees also have the potential to draw in new students to the other science programs, as well.

    b. Trend Data. Provide projected enrollment statistics including numbers of majors and/or minors and full time equivalent (FTE) student enrollment;

Before the degrees in Computer Science (COSC) and Computer Information Systems (CIS) were discontinued in 2005, a typical upper-division cohort size was 10-15 in the COSC degree, with approximately 10 students each in both the Arts and Sciences and City College degrees in Computer Information Systems, for a total of 20-25 undergraduate and 10 professional students. Enrollment in the relevant college is approximately 60-70% of 2005 enrollment, so projected enrollment may be around

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12-15 students per upper-division cohort.

We project formal enrollment in the three related degrees, CIS, COSC, and CSGP to total at least 50 students by the end of three years from inception of the COSC and CSGP degrees. The CIS degree drew approximately 10-15 current Loyola students during the academic year of 2015-2016 and brought in 9 more freshmen for the 2016-2017 academic year. The original projection for the CIS degree was to enroll at least 20 students within the first three years of the program. Given that this goal has been exceeded within one year of the creation of the program, we are confident that the new goal of 50 total students within the next three years can be met.

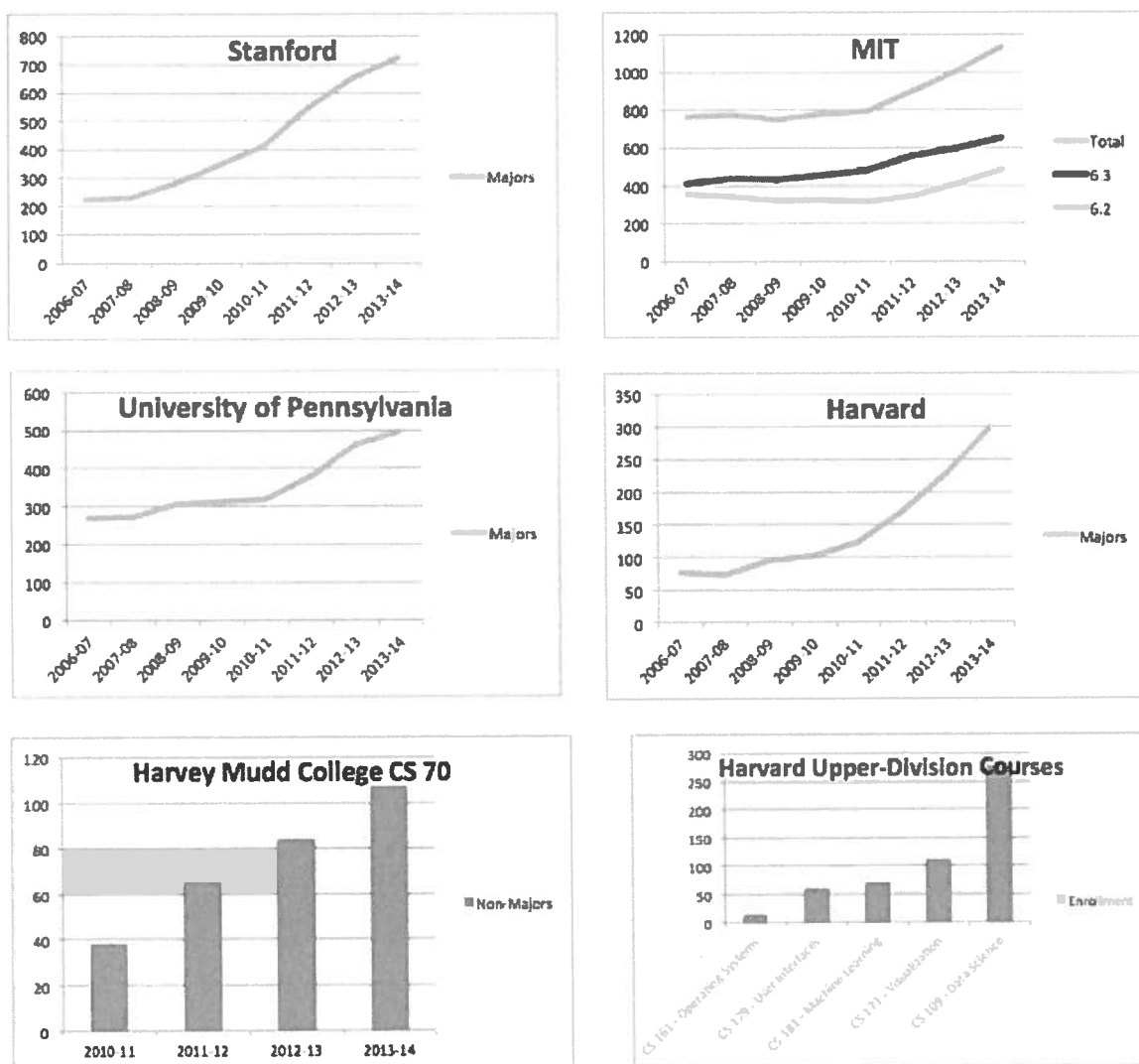   c.   Provide any other relevant information regarding potential market for the proposed program.

It is well known that computers and computer programming touches practically every professional employment opportunity available to college graduates. Every industry prefers to hire employees with significant technical background. According to geekwire[1]:

> ... interest in computer science from freshmen at the University of Washington in Seattle has skyrocketed since 2010 compared with other engineering fields. ... There were more than 850 students in UW's introductory programming class last quarter. Total enrollment in the past year was 2,700.... The UW is not alone. Countless other U.S. universities, from Harvard to Stanford to the University of Michigan, are seeing similar demand for computer science degrees.

The same source goes on to illustrate the increasing demand for Computer Science majors in academic settings and the challenge of meeting escalating levels of interest in Computer Science courses among students from other majors (see figure 1). Furthermore, according to the U.S. Bureau of Labor Statistics[2]:

> Employment of computer and information technology occupations is projected to grow 12 percent from 2014 to 2024, faster than the average for all occupations. These occupations are expected to add about 488,500 new jobs, from about 3.9 million jobs to about 4.4 million jobs from 2014 to 2024, in part due to a greater emphasis on cloud computing, the collection and storage of big data, more everyday items becoming connected to the Internet in what is commonly referred to as the "Internet of things," and the continued demand for mobile computing.
>
> The median annual wage for computer and information technology occupations was $81,430 in May 2015, which was higher than the median annual wage for all occupations of $36,200.

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Figure 1: Academic Trends in Computer Science[1]

OCCUPATION	ENTRY-LEVEL EDUCATION	2015 MEDIAN PAY
Computer and Information Research Scientist	Doctoral or professional degree	$110,620
Computer Network Architect	Bachelor's degree	$100,240
Computer Programmer	Bachelor's degree	$79,530
Computer Systems Analyst	Bachelor's degree	$85,800
Database Administrator	Bachelor's degree	$81,710
Information Security Analyst	Bachelor's degree	$90,120
Network and Computer Systems Administrator	Bachelor's degree	$77,810
Software Developer	Bachelor's degree	$100,690
Web Developer	Associate's degree	$64,970

Table 1: Median Pay by Occumpation[2]

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In addition to national trends of academic expansion in the field of Computer Science, in the past decade, the State of Louisiana has seen a substantial influx of tech companies relocating to do business here. Large companies like GE Capital are beginning to see the local market as ripe for recruitment and investment. In 2012, GE Capital committed to producing 300 new local IT jobs with salaries up to $100,000[6]. In Fall 2013, GE Capital committed $1M annually to University of New Orleans's Computer Science department to provide assistance for a software engineering apprenticeship degree which routes UNO students directly to GE technology positions. Other companies in the tech industry seem to be following GE Capital's lead, especially in the gaming industry, such as Electronic Arts, High Voltage Software, and InXile Entertainment.

A major reason for the dynamic upturn in gaming industry investment in the State of Louisiana is due to the generous tax credits offered by the state. Over the past 14 years, the state has attracted countless medium and large scale productions in the film industry by offering substantial tax credit incentives. Due to these tax credits, Louisiana quickly became known as "Hollywood South". Recent legislative cutbacks to these tax credits have resulted in a notable decline in interest from the film industry. However, in 2008 the state initiated a similar program to entice gaming companies to relocate to the state:[4]

> Louisiana provides a tax credit of up to 25.2% on qualified payroll and 18% for qualified production expenditures for software development through June 30, 2018. After that date, the credit increases to 35% of qualified labor and 25% of qualified expenditures. There is no annual cap on the amount of credits that a company can accumulate, there is no minimum requirement of jobs of expenditures, and the legislation has no sunset or end date.

Fortunately, these tax credit incentives survived Louisiana's recent financial crisis and dramatic cutbacks. Arguably, one of the reasons for this is that these incentives bring in permanent and long-term employment by specifically targeting companies to relocate to the state and invest in local economies. A number of companies are already enjoying the benefits of this program.

Electronic Arts was one of the first investors to the region. They partnered with Louisiana State University to share a new $29 million Digital Media Center in Baton Rouge. In addition to providing educational infrastructure to the University, the Digital Media Center houses 400 Electronic Arts employees.[4]

Gameloft, a company with a large international presence, moved offices from New York City to New Orleans in 2011 and committed to creating 146 jobs during the next decade with an average salary of $69,000 per year plus benefits.[5]

Recently two major companies[5], High Voltage Software and InXile Entertainment, have relocated much of their corporate structure to the City of New Orleans. High Voltage Software has committed to creating 80 direct jobs with salaries ranging from $50,000 to $120,000 per year. InXile Entertainment is

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looking to expand to 50 jobs with an average salary of $75,000 per year. These numbers do not include the indirect jobs generated by the presence of these companies. Furthermore, these numbers do not account for the multitude of freelance game developers flooding the region.

Other universities within the region have begun to respond to the needs for more Computer Science majors and, to a lesser extent, the need for qualified graduates with skills appropriate to the game programming industry. The proposed degrees in COSC and CSGP compare favorably to similar degrees offered at University of New Orleans, Tulane, Southeastern Louisiana University, Louisiana State University, and University of Louisiana at Lafayette. The attached tables "Computer Science Degree Comparison" and "Computer Science Game Programming Degree Comparison" in the appendix illustrate this. Fundamentally, the proposed degrees compare favorably to the comprehensive degrees provided by UNO and ULL with minor variations in course descriptions and offerings. These two schools also offer separate degrees in "Game Development Concentration" and "Video Game Design & Development Concentration" respectively, both of which expand on their general Computer Science degrees by requiring approximately the same number of focus courses that we propose. The proposed CSGP degree differentiates itself from the degree offered by UNO in that it allows students more flexibility in gaming-related elective courses. On the other hand, the game programming concentration from ULL gives about the same number of selections. Furthermore, the proposed CSGP degree encourages some diversity in course selection by requiring students to select from two distinct pools. Despite the liberal arts nature, the proposed COSC degree requires *substantially more computer science* course work than degrees offered by Tulane, LSU, and SELU. These schools do not offer comparable game programming degrees or concentrations.

Among peer institutions, requirements for a BS in Computer Science vary widely. The degree is offered by such peer Jesuit schools as Fordham University, John Carroll University, Saint Peter's University, Scranton University, and numerous others. There is very little commonality among course offerings or degree intensity.

[1] http://www.geekwire.com/2014/analysis-examining-computer-science-education-explosion/
[2] http://www.bls.gov/ooh/computer-and-information-technology/home.htm
[3] http://fortune.com/2015/11/23/video-games-help-rebuild-new-orleans/
[4] http://fortune.com/2014/03/25/louisiana-tax-incentives-attract-videogame-companies/
[5] http://gnoinc.org/about/digital-media-incentive/
[6] http://www.theesa.com/article/incentives-education-investments-help-video-games-revitalize-local-economies/

      d. If available from the Office of Institutional Research and Effectiveness (OIRE), provide national trend data for degrees awarded over the last five years.

See part c, above.

4. Relationship to Other Existing Programs

a. Describe ways in which the proposed program will enhance/complement existing programs and curricula, including potential service to majors, minors, other programs and/or the Loyola Core.

The proposed COSC and CSGP degrees will complement the existing degree in CIS. These two new degrees will give the students opportunities to study different aspects of Computer Science. Currently the CIS degree concentrates on business applications in Computer Science. The COSC degree focuses students to learn core concepts that are both practical and theoretical in the field of Computer Science. The CSGP degree allows students to build on the core Computer Science knowledge base into secondary fields with coursework relevant to the game programming industry. We anticipate that students will switch among these degrees; for example, it would be easy for a student to switch from one degree in COSC, CSGP, or CIS to any of the others. This occurred often when we originally had degrees in COSC and CIS. This flexibility should aid in student retention.

b. Describe ways in which the proposed program overlaps with other existing programs.

The proposed COSC and CSGP degrees will overlap with the existing CIS degree, as well as with the minors in Computational Science and Computer Science. These degrees of study are distinct but are close enough to allow students to switch among them if a student desires. This provides the curriculum with a great deal of flexibility and should aid in student retention.

As well, COSC courses fulfill the foreign language requirement for some Loyola science degrees, further broadening the student base for these courses.

5. **Adequacy and appropriateness of resource utilization**
    Evaluate the availability of resources to meet the program's priorities and build strengths. Provide information regarding:
    a. Financial Plan including:
        i. Annual operating budget

At the moment we need no new hardware of software. Dean Calzada used existing tech fees to provide us with funding to upgrade our departmental lab to 15 machines. Dr. McDermott has downloaded free software for these machines and used his technical expertise to assemble and optimize the lab.

Each Spring IT has met with our department to discuss hardware and software needs. We have always been able to satisfy our needs within existing budgets. We do not anticipate any additional expenditures.

ii. Actual or potential external grants

The proposed COSC and CSGP degrees will enhance our chances for funding in the future by

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demonstrating the ability to keep up with current technology. For example, Computer Science is in the Board of Regents Enhancement Grants rotation of eligible disciplines.

iii. Contributions to and impact on fundraising

Having the proposed COSC and CSGP degrees in place would prove to potential donors that Loyola is a leader in modern education.

Several alumni have graduated in the past with a degree in Computer Science or Computer Information Systems. Having these proposed degrees in place could help attract support from these alumni.

iv. Plan for profit sharing, if applicable

N/A.

v. Accreditation or certification expenses

None.

b. Current faculty resources, including those available through consortial agreements, and number of new faculty required (may involve a stepped approach depending on enrollment projections)

Current qualified faculty members who are potentially available to offer new or existing courses in support of the proposed degrees include Dr. Scott McDermott, Dr. Ralph P. Tucci, and Dr. Xuefeng Li. Both Dr. Tucci and Dr. Li currently teach Mathematics courses, but are also qualified in Computer Science and have taught courses in Computer Science. Dr. McDermott is teaching Computer Science courses full-time.

To offer sufficient courses to students in the proposed degree programs, the College of Arts and Sciences will need a new full-time position in Computer Science. The Dean of Arts and Sciences has allocated funds in support of this position. Fortunately, the existing CIS degree and the proposed COSC and CSGP degrees all draw upon the same faculty resources. Additional adjunct instruction on the order of 1 or 2 course sections per academic year could be required from time to time depending on enrollment.

The department has professional connections with former Loyola Computer Science instructors, instructors from other institutions, and also with local professionals in the gaming and computer science industry. The department will leverage these contacts in order to satisfy instructional resources for either full-time or part-time needs.

    c.   Administrative support staff resources

No new support staff resources are required.

    d.   Space requirements (including both instructional space and administrative support space) and classroom technology

The department currently has office space for a new full-time faculty member.

The newly developed departmental computer lab with 15 machines is currently being utilized for 6 credit hours and independent project time. There is ample availability for further coursework and teaching.

    e.   Course development expenses

Current resources are adequate. There will be no course development expenses because all required courses are currently on the books. The Computer Science minor and the CIS degree have been adequately served by current resources. Moreover, almost all of the necessary software for teaching these subjects is currently available for free. For example, we recently offered COSC A317 Data Structures and students used a free online C++ compiler. COSC A270 Introduction to Relational Databases uses Microsoft Access which is readily available in the classroom labs. As well, we are currently offering COSC A217 Object Oriented Programming and COSC A319 Internet Technology which do not require any new expenditures or resources.   Other courses would not require any new hardware, software, or space resources.

    f.   Library
        i.   Information and instructional technology resources (e.g., books, journals, databases, learning management system capabilities, streaming media, videoconferencing, classroom capture)

Instructional technology resources are adequate. The departmental lab has been used for years both for students studying Computer Science, and also for students in the Computational Science minor working on computational projects in Chemistry and Physics. This lab, the classroom labs, and the labs in the library, provide adequate technology resources.

        ii.   Confirm that discussion with library representatives has taken place to assure appropriate resources are available.

Please see the attached letter from Mr. Hobbs in the appendix.

    g.   Information Technology and other Technology Needs (e.g., network capacity, lab software, computers, etc.)

Library resources are adequate. Please see the attached letter from Mr. Hobbs in the appendix.

We have received additional computers from Dean Calzada to refresh the departmental lab in support of the current CIS degree from existing student tech fees.

IT has provided adequate support for needed resources. We are confident that this support will continue to be adequate. Each Spring IT has met with our department to discuss hardware and software needs. We have always been able to satisfy our hardware and software needs within existing budgets. We do not anticipate any additional expenditures.

> h.   Other academic support services

Current university, college, and library resources are sufficient. Current student support in the College of Arts and Sciences is sufficient.

> **6.   Assessment – Projected**
> > a.   Provide the program's projected assessment plan that includes student learning outcomes, process of implementation, and results;

Students learning objectives in the Computer Science courses are as follows:

SLO 1   Students will learn the fundamentals of program design.
SLO 2   Students will learn the fundamentals of program implementation.
SLO 3   Students will learn the principles of good documentation.
SLO 4   Students will learn the fundamentals of algorithm design.
SLO 5   Students will create and manipulate databases.
SLO 6   Students will learn fundamental concepts of game programming.
SLO 7   Students will learn the fundamentals of computer graphics and the graphics pipeline.
SLO 8   Students will learn core concepts of computer design and architecture.
SLO 9   Students will learn core concepts of programming languages.
SLO 10 Students will learn core concepts of compilers and assembly language.
SLO 11 Students will learn core concepts of operating systems.
SLO 12 Students will learn core concepts of software design and implementation.
SLO 13 Students will learn core concepts of networking and Internet infrastructure.
SLO 14 Students will learn core concepts of mobile applications and distributed systems.
SLO 15 Students will learn core concepts neural networks and artificial intelligence.

Student Learning Outcome Matrix for Preparatory Programming Courses

Preparatory Programming Courses
COSC A211 – Introduction to Programming I
COSC A212 – Introduction to Programming II
COSC A217 – Object-Oriented Programming

SLO	COSC A211	COSC A212	COSC A217
SLO 1	X	X	X
SLO 2	X	X	X
SLO 3	X	X	X
SLO 4	X	X	
SLO 9			X
SLO 14			X

Student Learning Outcome Matrix for Core Comprehensive Courses

Core Comprehensive Courses
COSC A270 – Introduction to Relational Databases (for COSC)
COSC A280 – Introduction to Computer Graphics (for CSGP)
COSC A315 – Computer Organization
COSC A317 – Data Structures (Data Structures & Algorithms)
COSC A361 – Languages & Paradigms (Programming Languages)
COSC A365 – Operating Systems
COSC A451 – Software Engineering

SLO	COSC A270	COSC A280	COSC A315	COSC A317	COSC A361	COSC A365	COSC A451
SLO 1				X	X	X	X
SLO 2			X	X	X		X
SLO 3				X			X
SLO 4				X	X		X
SLO 5	X			X			
SLO 6		X					X
SLO 7		X	X				
SLO 8			X			X	
SLO 9			X		X		
SLO 10			X		X		X
SLO 11			X			X	
SLO 12				X	X		X
SLO 13	X						
SLO 15						X	X

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Student Learning Outcome Matrix for COSC Elective Courses

Major Electives for COSC

COSC A280 – Introduction to Computer Graphics
COSC A319 – Internet Technologies
COSC A405 – Artificial Intelligence
COSC A425 – Computer Graphics (Advanced Graphics)
COSC A471 – Communication and Network Systems

SLO	COSC A280	COSC A319	COSC A405	COSC A425	COSC A471
SLO 1		X			
SLO 2		X			
SLO 3		X			
SLO 4			X		
SLO 6	X			X	X
SLO 7	X				X
SLO 12		X			
SLO 13		X			X
SLO 14		X			X
SLO 15			X		

Student Learning Outcome Matrix for CSGP Elective Courses (Artistic Pool)

Major Electives for CSGP (Artistic Pool)

CMMN X202 – Game as Art
CMMN X237 – Media Play
DSGN M276 – Interactive Design
ENGL A222 – Doing Things w/ Videogames
ENGL N205 – Videogames and Lit
MUGN M225 – Digital Audio Prod
VISA A*** – (any one Vis. Arts)

SLO	CMMN X202	CMMN X237	DSGN M276	ENGL A222	ENGL N205	MUGN M225	VISA A***
SLO 6	X	X	X	X	X	X	X

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Student Learning Outcome Matrix for CSGP Elective Courses

Major Electives for CSGP (Technical Pool)
COSC A319 – Internet Technologies
COSC A405 – Artificial Intelligence
COSC A425 – Advanced Graphics
MATH A375 – Comp. Mathematics
PHYS A340 – Classical Mechanics
PHYS Y231 – Physics of Sound

SLO	COSC A319	COSC A405	COSC A425	MATH A375	PHYS A340	PHYS Y231
SLO 1	X					
SLO 2	X					
SLO 3	X					
SLO 4		X		X		
SLO 6		X	X		X	X
SLO 7			X			
SLO 12	X					
SLO 13	X					
SLO 14	X		X			
SLO 15		X				

b. Provide the results of any external reviews or plans for reviews, if available;

Currently we have no plans for external reviews.

c. Describe the structure and process for administrative and academic oversight;

Students will be judged on their performance in the final examination in their courses. A student who completes a practicum/internship will write a report on his/her work; the student's supervisor will then write a report on the student's activities, which the evaluation committee will assess.

Final exams in the appropriate courses will be collected each year. Reports on practicum/internships will also be collected. Those who teach the Computer Science courses, as well as the chairman of the Department of Mathematical Sciences, will meet to discuss the results each year. Course content, assignments, tests, and general pedagogical issues will be modified according to the results of the assessment.

The COSC and the CSGP programs will be housed in the Department of Mathematical Sciences. The chair of the department will have the administrative oversight of the programs. The Department of Mathematical Sciences is housed in the College of Arts and Sciences under the administrative oversight of the Dean and Associate Dean of Arts and Sciences.

III.   Impact on the Curriculum:

*Criteria of Standing Council for Academic Planning for new program proposals. Proposals for new programs will be reviewed using these criteria. While all criteria may not be satisfied, all criteria must be addressed in a proposal.

a. Provide copies of the old and new Degree Course Program Lists (DPCL), Progression Plan (PP), or equivalent

The proposed degree in COSC includes the entire Loyola Core curriculum of 40 credit hours, plus a 36-credit hour Computer Science core consisting of 3 preparatory courses, 6 core comprehensive courses, and 3 major electives which could be used to tailor a student's degree to their unique area of interest. The COSC degree leaves 23 credit hours for general electives, allowing students to pursue a minor and still be within the required 120 credit hours for the degree. Most importantly, the degree would also require 2 internships (5 credits) in order to provide on-the-job experience critical to a Computer Science degree. See the DPCL in the appendix.

The proposed degree in CSGP includes the entire Loyola Core curriculum of 40 credit hours, plus a 27-credit hour Computer Science core consisting of 3 preparatory courses and 6 core comprehensive courses. This track replaces the COSC A270 Relational Databases course with the COSC A280 Computer Graphics course as a core requirement. Instead of the 3 major electives, the GP track would require 3 courses from a list of selected game programming electives. These major electives are grouped into two distinct pools, the artistic pool and the technical pool. Students would be required to select at least one course from each pool to encourage a diverse experience. The CSGP degree leaves 23 or 24 credit hours for general electives, allowing students to pursue a minor and still be within the required 120 credit hours for the degree. Most importantly, the degree would also require 2 internships (5 credits) in order to provide on-the-job experience critical to a Computer Science degree. The degree further requires an extra capstone special project course that provides an opportunity to develop and refine game programming experience, which is critical for potential employment opportunities. See the DPCL in the appendix.

b. Provide the following information
  i. New Programs
      1. Specify whether any new courses will be offered, and whether this will increase the total number of courses or sections offered by the department

There are no new courses planned at this time. All the courses below are either currently being offered or have been offered previously by the university.

In the current bulletin:
COSC A208 – Information Systems Theory
COSC A211 – Introduction to Programming I
COSC A212 – Introduction to Programming II
COSC A217 – Object-Oriented Programming
COSC A315 – Computer Organization
COSC A317 – Data Structures (Data Structures & Algorithms)

COSC A319 – Internet Technologies
COSC A451 – Software Engineering
COSC A471 – Communication and Network Systems
COSC A492 – Practicum/Internship I
COSC A493 – Special Topics in Computer Science
COSC A495 – Special Project in Computer Science
COSC A497 – Practicum/Internship II
COSC A498 – Research Project
COSC A499 – Independent Study

In previous bulletins:
COSC A280 – Introduction to Computer Graphics
COSC A361 – Languages & Paradigms (Programming Languages)
COSC A365 – Operating Systems
COSC A405 – Artificial Intelligence
COSC A425 – Computer Graphics (Advanced Graphics)

To maintain a sufficient number of major required courses and electives to meet the needs of students in the current CIS and proposed COSC and CSGP degrees, approximately 5 to 8 additional sections will eventually need to be offered each academic year.

2. To what extent will any new courses for this program impact upon resources in the departments and programs in which these faculty are teaching? Will any new courses replace courses currently offered? Will any such courses prevent an important or required course from being offered in a given semester?

Current qualified faculty members who are available to offer new or existing courses in support of the proposed degrees include Dr. Scott McDermott, Dr. Ralph P. Tucci, and Dr. Xuefeng Li. Both Dr. Tucci and Dr. Li currently teach Mathematics courses, but are also qualified in Computer Science and have taught courses in Computer Science. Dr. McDermott is teaching Computer Science courses full-time.

To offer sufficient courses for adequate service to students in the proposed degree, the College of Arts and Sciences will need a new full-time position in Computer Science. The Dean of Arts and Sciences has allocated funds in support of this position. Fortunately, the current CIS degree and the proposed COSC and CSGP degrees all draw upon the same faculty resources. Additional adjunct instruction on the order of 1 or 2 course sections per academic year could conceivably be required from time to time depending on enrollment.

No new courses will be offered. No new courses will replace currently offered courses. No new courses will prevent a required course from being offered in a given semester.

3. Will there be a service learning component? Description of this component to be provided by director of service learning.

No service learning component is planned as a requirement for initial implementation.

4. If new courses will not increase the overall number of offerings, specify which course(s) or section(s) will be dropped in a given semester to create room.

No new courses are proposed. Eventually, the number of new course sections would be an increase in the overall number of offerings.

5. Specify any anticipated impact on enrollments in other courses or sections within the department and whether or not this program will prevent an important or required course from being offered in a given semester.

To the extent that the proposed degree creates net new enrollment for the university, enrollment in the required mathematics courses such as MATH A257 Calculus I, MATH A258 Calculus II, MATH A200 Linear Algebra, and MATH A260 Statistical Inference, would also increase. The increase could be absorbed into current offerings in these areas. Since the inception of the new CIS degree, the enrollment levels in the regularly offered sequence in programming, COSC A211 Intro to Programming I and COSC 212 Intro to Programming II, have increased significantly, necessitating new sections.

In the event that enrollment in these courses increases to the point that new sections need to be opened due to demand of the new degree (which would represent net new enrollment to the university), the increased course load would be balanced by additional adjunct lines.

IV. **New Course Proposals**
   a. List titles of any new courses created for this program.

There are no new courses planned at this time.

   b. Attach proposals for all new courses including assessment plan, learning outcomes and complete syllabus, each with a Course Proposal cover sheet.

No new courses are proposed.

Include as appendix a copy of the projected Degree Program Course List (DPCL), Progression Plan (PP), or equivalent for each program of study.

UC&CC approved 11/29/2012, Revised with updated SCAP criteria for new programs - July 2016

*Criteria of Standing Council for Academic Planning for new program proposals. Proposals for new programs will be reviewed using these criteria. While all criteria may not be satisfied, all criteria must be addressed in a proposal.

Degree Program Course List (DPCL) of major requirements for students entering Loyola in 2017-18
B.S. COMPUTER SCIENCE – COSC

NAME: _____ **DATE:** _____

English Composition Placement is:

ALEKS MATH COURSE PLACEMENT	
ACT ENGL score 21 or above	76-100, MathA257, Calculus 1
SAT Verbal score 501 or above	
Register for ENGL-T122	46-75, MathA118, Pre-Calculus
ACT ENGL score 20 or below	
SAT Verbal score 500 or below	0-45, MathA092, Fundamentals of Algebra
Register for ENGL-A100	*(not counted in final degree credits)*

LOYOLA CORE – 40 Credits

	Crs/Grade
FOUNDATION COURSES	
First-Year Seminar T121	3 ___
Engl T122: Critical Reading and Writing	3 ___
Math A257: Calculus I	4 ___
Scie T129: Investigating Nature	3 ___
	13
KNOWLEDGE-VALUE COURSES	
Creative Arts and Cultures	3 ___
Hist I: T122: Global I/Emerging or T124: Global II/Modern*	3 ___
Choice here determines HistII course below	
Hist II*	3 ___
if HistT122 in ICC, take "Modern"; if T124 above, take "Emerging World"	
Phil I: Reasoning	3 ___
Phil II: Knowledge & Morality	3 ___
Rels I: Christian Theology	3 ___
Rels II: World Religions	3 ___
Social Science	3 ___
Scie II: (Fulfilled in Adjuncts)	0 ___
Writing About Literature	3 ___
	27

LANGUAGE Placement

Placement Course	3 ___
Higher course	3 ___
	6

Language - Choose from Spoken A100, A101, A200, A201 or Classical A100, A101, A250, A251-A499; students are not required to take language above the A201 level.

MAJOR ...... 41 Crs ADJUNCT ...... 10 Crs

Computer Science: ...... 36 Crs

Intro to Programming I — COSC A211	3 ___
Intro to Programming II — COSC A212	3 ___
Object-Oriented Programming — COSC A217	3 ___
Intro to Relational Databases — COSC A270	3 ___
Computer Organization — COSC A315	3 ___
Data Structures & Algorithms — COSC A317	3 ___
Programming Languages — COSC A361	3 ___
Operating Systems — COSC A365	3 ___
Software Engineering — COSC A451	3 ___
COSC Elect	3 ___
COSC Elect	3 ___
COSC Elect	3 ___

Linear Algebra

MATH A200	3 ___

Choose one from the following:

Calculus II — MATH A258	4 ___
MATH A204: Discrete Math Structures	
MATH A260: Statistical Inference	
MATH A271: Applied Scientific Computing	3 ___

GENERAL ELECTIVES ...... 23 Crs

Practical Experience: ...... 5 Crs

Internship I	2 ___
Internship II	3 ___

Loyola Core	40 crs
Language	6 crs
Major	41 crs
Adjuncts	10 crs
General Elective	23 crs
Total ...... 120 crs	

GPA: Must achieve 2.0 in Major, cumulative.

Minor (if declared), and Loyola Core requirements are governed by the catalog year that a student is admitted.

Courses used in the major cannot also be used to satisfy requirements for a minor: Non-major courses WILL be applied to minors as appropriate.

Computer Science Degree Comparison

	Programming I	Programming II	Object-Oriented Programming	Software Engineering	Relational Databases	Computer Organization (Architecture)	Programming Languages	Data Structures (Algorithms)	Operating Systems	Other (Graphics)	Other	Other	Other	Other
Old Loyola COSC (2003-2005)	COSC A211	COSC A212	COSC A119 (intro to CS)	COSC A216	COSC A270	COSC A315	COSC A361	COSC A363	COSC A365	COSC A280 (graphics)	COSC A300+	COSC A300+	COSC A300+	COSC A300+
Proposed Loyola COCS Degree	COSC A211	COSC A212	COSC A217	COSC A451	COSC A270	COSC A315	COSC A361	COSC A317	COSC A365	COSC A300+	COSC A300+	COSC A300+	Internship (2cr)	Internship (5cr)
UNO (12 core)	CSCI 1583 (+ 1cr lab)	CSCI 2120 (+ 1cr lab)	CSCI 2125	CSCI 2467	CSCI 4125	CSCI 3301	CSCI 4501	CSCI 4101	CSCI 4401	CSCI 2450 (assembly)	CSCI 4311 (networks)	CSCI 3102 (computation)	(+ 1cr seminar & 1cr ethics)	
Tulane (Coordinate Major)	CMPS 1500	CMPS 1600						CMPS 2200			CMPS 2300 (networks)			
UIL (12 core)	CMPS 150	CMPS 260	CMPS 261	CMPS 453	CMPS 460	CMPS 430	CMPS 450	CMPS 340	CMPS 455	CMPS 351 (assembly)	CMPS 341 (foundations)	CMPS 310 2cr (comp in soc)		
SELU (11 core)	CMPS 161	CMPS 280	CMPS 285			CMPS 375	CMPS 401	CMPS 390	CMPS 431	CMPS 290 or CMPS 293	CMPS 293 (assembly)	CMPS 482 (curr trends)	CMPS 415 (integ tech)	CMPS 411 (capstone)
LSU (9 core)	CSC 1350	CSC 1351	CSC 3380	CSC 4330		CSC 3501	CSC 4101	CSC 3102	CSC 4103					

B.S. COMPUTER SCIENCE
Example 4-year schedule for completion of degree program

FRESHMAN YEAR	FALL		SPRING
COSC A211: Intro to Programming I	3	COSC A212: Intro to Programming II	3
FYE T121: First-Year Seminar	3	RELS I: Christian Theology	3
PHIL I: Reasoning	3	PHIL II: Knowledge & Morality	3
Foreign Language	3	Foreign Language	3
ENGL T122: Critical Reading & Writing	3	MATH A200	3
	15		**15**

SOPHOMORE YEAR	FALL		SPRING
COSC A217: Object-Oriented Prog	3	COSC A270: Intro to Rel. Databases	3
MATH A257: Calculus I	4	MATH A258: Calculus II	4
HIST I: T122/4: Global History I / II	3	HIST II:	3
Writing About Literature	3	SCIE T129: Investigating Nature	3
General Elective	3	General Elective	3
	16		**16**

JUNIOR YEAR	FALL		SPRING
COSC A315: Computer Organization	3	COSC A361: Programming Languages	3
COSC A317: Data Structures & Algs	3	COSC A***: Major Elective	3
Social Science	3	MATH A204, A260, or A271	3
RELS II: World Religions	3	Creative Arts & Cultures	3
General Elective	3	General Elective	3
	15		**15**

SENIOR YEAR	FALL		SPRING
COSC A365: Operating Systems	3	COSC A451: Software Engineering	3
COSC A***: Major Elective	3	COSC A***: Major Elective	3
Internship I	2	Internship II	3
General Elective	3	General Elective	3
General Elective	3	General Elective	2
	14		**14**

Degree Program Course List (DPCL) of major requirements for students entering Loyola in 2017-18
B.S. COMPUTER SCIENCE – CSGP (GAME PROGRAMMING TRACK)

NAME: _____   DATE: _____

FOUNDATION COURSES

English Composition Placement is

	ALEKS MATH COURSE PLACEMENT	
ACT ENGL score 21 or above	76-100, MathA257, Calculus 1	
SAT Verbal score 501 or above		
Register for ENGL-T122	46-75, MathA118, Pre-Calculus	
ACT ENGL score 20 or below		
SAT Verbal score 500 or below	0-45, MathA092, Fundamentals of Algebra	
Register for ENGL-A100	_____ (not counted in final degree credits)	

LOYOLA CORE – 40 Credits

Crs/Grade

First-Year Seminar T121 _____ 3

Engl T122: Critical Reading and Writing _____ 3

Math A257: Calculus I _____ 4

Scie T129: Investigating Nature _____ 3

KNOWLEDGE-VALUE COURSES — 13

Creative Arts and Cultures _____ 3

Hist I: T122: Global I/Emerging or T124: Global II/Modern* _____ 3

*Choice here determines HistII course below

Hist II* _____ 3

*if HistT122 in ICC, take "Modern"; if T124 above, take "Emerging World"

Phil I: Reasoning _____ 3

Phil II: Knowledge & Morality _____ 3

Rels I: Christian Theology _____ 3

Rels II: World Religions _____ 3

Social Science _____ 3

Scie II: (Fulfilled in Adjuncts) _____ 0

Writing About Literature _____ 3

_____ 27

LANGUAGE Placement

LANGUAGE Placement Course _____ 3

Higher course _____ 3

Language – Choose from Spoken A100, A101, A200, A201 or Classical A100, A101, A250, A251-A499, students are not required to take language above the A201 level.

MAJOR .... 44 Crs

Computer Science: .... 27 Crs

		Crs/Grade
Intro to Programming I	COSC A211	3
Intro to Programming II	COSC A212	3
Object-Oriented Programming	COSC A217	3
Data Structures & Algorithms	COSC A317	3
Computer Organization	COSC A315	3
Operating Systems	COSC A365	3
Programming Languages	COSC A361	3
Software Engineering	COSC A451	3
Computer Graphics	COSC A280	3

Game Programming Electives**: .... 9 Crs

_____ 3
_____ 3
_____ 3

ADJUNCT .... 6 or 7 Crs

Intro to Linear Algebra | MATH A200 | 3

Choose one from the following:

MATH A204: Discrete Math Structures | 3
MATH A258: Calculus II (4 Crs) |
MATH A260: Statistical Inference |
MATH A271: Applied Scientific Computing | 3 or 4

GENERAL ELECTIVES .... 23 or 24 Crs

_____ 3
_____ 3
_____ 3
_____ 3
_____ 2 or 3

*Game Programming Electives
(Choose any three. At least one must come from each pool)

Artistic Pool

Game as Art	CMMN X202
Media Play	CMMN X237
Interactive Design	DSGN M276
Doing Things w/Vidgames	ENGL A222
Videogames and Lit	ENGL N205
Digital Audio Prod	MUGN M225
(any one Vis. Arts)	VISA A***

Technical Pool

Internet Technologies	COSC A319
Artificial Intelligence	COSC A405
Advanced Graphics	COSC A425
Comp. Mathematics	MATH A375
Classical Mechanics	PHYS A340
Physics of Sound	PHYS Y231

Loyola Core	40 crs
Language	6 crs
Major	44 crs
Adjuncts	6 or 7 crs
General Elective	3
Total	23 or 24 crs
	120 crs

Loyola Core requirements are governed by the catalog year that a student is admitted.

GPA: Must achieve 2.0 in Major, Minor (if declared), and Loyola cumulative.

Courses used in the major cannot also be used to satisfy requirements for a minor: Non-major courses WILL be applied to minors as appropriate.

Practical Experience: .... 8 Crs

Internship I _____ 2

Internship II _____ 3

Capstone Special Project _____ 3

Internship _____ 6

Computer Science Game Programming Degree Comparison
(Shaded Areas Indicate Deviations from CS Degree)

	Programming I	Programming II	Object-Oriented Programming	Software Engineering	Relational Databases	Computer Organization (Architecture)	Programming Languages	Data Structures (Algorithms)	Operating Systems	Computer Graphics	Other	Other	Other	Other
Old CS Degree (2003-2005)	No Game Programming Degree Offered													
Proposed Loyola CSGP Degree	COSC A211	COSC A212	COSC A217	COSC A451	COSC A315	COSC A361	COSC A317	COSC A365	COSC A280		Internship (2cr)	Internship (5cr)		
UNO (12 core)	CSCI 1583 (+ 1cr lab)	CSCI 2120 (+ 1cr lab)	CSCI 2125	CSCI 2467	CSCI 4125	CSCI 3301	CSCI 4501	CSCI 4101	CSCI 4401	CSCI 4631	CSCI 2450 (assembly)	CSCI 4311 (networks)	CSCI 3102 (computation)	(+ 1cr seminar & 1cr ethics)
Tulane (Coordinate Major)	No Game Programming Degree Offered													
ULL (12 core)	CMPS 150	CMPS 260	CMPS 261	CMPS 453	CMPS 460	CMPS 430	CMPS 450	CMPS 340	CMPS 455	CMPS 351 (assembly)	CMPS 341 (foundations)	CMPS 310 2cr (comp in soc)	CMPS 327 Intro To Video Game Design And Development	CMPS 427 Video Game Design And Development
SELU (11 core)	No Game Programming Degree Offered													
LSU	No Game Programming Degree Offered													

Proposed Loyola CSGP Degree — additional required courses:
- CSCI 4661 Topics in Mobile Applications Development
- CSCI 4670 Fundamentals of Game Development
- CSCI 4675 Advanced Game Development
- Team Oriented CSCI Elective (3cr)

Plus pick three electives from: (At least one must come from each pool) (see DPCL)
- Artistic Pool (see DPCL)
- Technical Pool (see DPCL)
- Capstone Special Project (3cr)

ULL — Plus pick three electives from:
- CMPS 359 Topics in SW Dev
- CMPS 415 Computer Graphics
- CMPS 420 Artificial Intelligence
- INFX 210 Human-Computer Interaction
- CMCN 365 Single-Camera Production
- ENGL 223 Introduction to Creative Writing
- ENGL 325 Creative Writing- Fiction
- ENGL 327 Creative Writing- Drama
- THEA 251 Stagecraft
- THEA 300 Activities in Dramatics
- VIAR 235 Art and the Computer
- VIAR 365 Introduction to Computer Animation
- VIAR 366 Intermediate Computer Animation
- VIAR 465 Advanced Computer Animation

B.S. COMPUTER SCIENCE (GAME PROGRAMMING)
Example 4-year schedule for completion of degree program

FRESHMAN YEAR	FALL		SPRING
COSC A211: Intro to Programming I	3	COSC A212: Intro to Programming II	3
FYE T121: First-Year Seminar	3	RELS I: Christian Theology	3
PHIL I: Reasoning	3	PHIL II: Knowledge & Morality	3
Foreign Language	3	Foreign Language	3
ENGL T122: Critical Reading & Writing	3	MATH A200	3
	15		**15**

SOPHOMORE YEAR	FALL		SPRING
COSC A217: Object-Oriented Prog	3	COSC A280: Computer Graphics	3
MATH A257: Calculus I	4	MATH A204, A258, A260, or A271	3
HIST I: T122/4: Global History I / II	3	HIST II:	3
Writing About Literature	3	SCIE T129: Investigating Nature	3
General Elective	3	General Elective	3
	16		**15**

JUNIOR YEAR	FALL		SPRING
COSC A315: Computer Organization	3	COSC A361: Programming Languages	3
COSC A317: Data Structures & Algs	3	Game Programming Elective	3
Game Programming Elective	3	Creative Arts & Cultures	3
RELS II: World Religions	3	General Elective	3
General Elective	3	General Elective	3
	15		**15**

SENIOR YEAR	FALL		SPRING
COSC A365: Operating Systems	3	COSC A451: Software Engineering	3
Game Programming Elective	3	Social Science	3
Internship I	2	Internship II	3
General Elective	3	General Elective	3
General Elective	3	Capstone Special Project	3
	14		**15**