BACHELOR OF SCIENCE

in Computer Science

Program Description

The BS Computer Science program includes the study of computing concepts and theories, algorithmic foundations and new developments in computing. The program prepares students to design and create algorithmically complex software and develop new and effective algorithms for soling computing problems.

The program also includes the study of the standards and practices in Software Engineering. It prepares students to acquire skills and disciplines required for designing, writing and modifying software components modules and applications that comprise software solutions.

Program Educational Objectives

Within three to five years after obtaining a Bachelor's degree in Computer Science, our graduates are expected to:

1. Possessed a significant role in development team confident to produce high-quality software solutions and in research and development in various application domains which includes the use of game technologies and data science.
2. Exhibited high standards of professionalism while maintaining social and ethical responsibilities both in local and international organizational environment
3. Capable of communicating and engaging in life-long learning activities relevant to their profession, including earning advanced degrees, attaining professional certification and engaging in research activities to further nation building and national development.

Program Outcomes

By the time of graduation, the students of the program shall be able to:

1. Apply knowledge of computing fundamentals, mathematics, science, and domain knowledge appropriate for computer science specialization to the abstraction and conceptualization of models from defined problems and requirements.
2. Apply knowledge in algorithms that can be used in solving complex programming problems.
3. Apply software engineering practice over the entire system lifecycle activities and management of risks involved in software and embedded systems which meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. Adapt appropriate techniques, resources and modern computing tools to complex activities, with an understanding of the limitations to accomplish a common goal.
5. Acquire knowledge and understanding of information security issues in relation to the design, development and use of information systems.
6. Work with a range of technologies employed within the game industry, such as hand-held devices, desktop devices, and consoles
7. Utilize the tools and techniques used in the development of mobile systems
8. Use scientific methods such as data science in analyzing and interpreting data.
9. Utilize new and emerging technologies, such as artificial intelligence, cloud technology and natural language processing, as a necessity for life-long learning

10. Formulate solution to the complex problem using a programming language, mathematics, algorithms, data structures, or an appropriate blend of technologies.
11. Communicate effectively with the computing community and with society at large by being able to comprehend and write effective reports, design documentation, make effective presentations, and give clear instructions.
12. Adopt appropriate industry practices in resolving real-world issues with legal, social, ethical and professional consideration involved in the utilization of computing technology
13. Engaged in research as an individual and as a member or leader for continued development of the individual, organization, and society in a multidisciplinary setting.

Admission Requirements

1. High School graduates and transferees seeking admission to the BSCS program must meet the criteria and cut-off scores set by the University for the BSCS program.
2. Shiftees must not have accumulated 15 or more units of failures.

Retention Policies

1. Students who fail in 50% or more of the subjects taken during the previous semester will be asked to shift to another course. Courses dropped are considered failed.
2. Students who fail in two or more major subjects in one semester shall be put on probation.
3. Student must not incur more than two failures in the same Math or CS Core/ Professional courses; otherwise they will be advised to drop from the program.

Teaching and Learning Activities

1. Lecture and Classroom discussions
2. Programming demonstration
3. Guided Hands-on Programming Sessions
4. Guided Design and Development of Project Specifications
5. Independent Project Requirements Gathering, Design and Implementation
6. Mentorship and Monitored Internships.
7. Case Analysis and Case Studies

BACHELOR OF SCIENCE
in Computer Science

FIRST YEAR

First Semester		Total Credit requisite	No. of hrs Lec Units	Lab	Total Assessed Units	Pre-requisite	Co-requisite
CC101A	Computer Science Fundamentals	3	3	0	3		
CC102	Computer Programming 1	3	2	3	5		
ARTAP	Art Appreciation	3	3	0	3		
MATHMW	Mathematics in the Modern	3	3	0	3		
PCOM	Purposive Communication	3	3	0	3		
STS	Science, Technology and Society	3	3	0	3		
IRS1	LaSallian Spirituality	3	3	0	3		
PED1	Physical Education 1 (Wellness and Fitness)	2	2	0	2		
IGG	Group Guidance 1	1.5	1.5	0	1.5		
	Total	**24.5**	**23.5**	**3**	**26.5**		

Second Semester		Total Credit requisite	No. of hrs Lec Units	Lab	Total Assessed Units	Pre-requisite	Co-requisite
CC103	Computer Programming 2	3	2	3	5	CC102	
CSP201	2D Game Art	3	2	3	5		
MATH1D	College Algebra	3	3	0	3		
ETHICS	Ethics	3	3	0	3		
LOGIC	Logic	3	3	0	3		
RVARTS	Reading Visual Art	3	3	0	3		
IRS2	Christian Morality	3	3	0	3		
PED2	Physical Education 2 (Team Sports and Rhythmic	2	2	0	3		
	Total	**23**	**21**	**6**	**27**		

SECOND YEAR

First Semester		Total Credit requisite	No. of hrs Lec Units	Lab	Total Assessed Units	Pre-requisite	Co-requisite
CSP202	Object Oriented Programming	3	2	3	5	CC103	
CSP203	Discrete Structures	3	3	0	3	MATH1	
CSP204A	System Analysis and Design	3	3	0	3		
CC104	Data Structures and Algorithms	3	3	0	3	CC103	
CC105	Information Management	3	3	0	5	CC103	
MATH2T	Trigonometry	3	3	0	3		
NSTP1	National Service Training Program	3	3	0	3		
PED3	Physical Education 3 (Swimming and Recreation)	2	2	0	2		
	Total	**23**	**21**	**3**	**27**		

Second Semester

Code	Title	Total Credit Units	No. of hrs Lec	No. of hrs Lab	Total Assessed Units	Pre-requisite	Co-requisite
CSP205	Applied Math for Games	3	3	0	3	CSP203	
CSP206	Analysis and Design of Algorithms	3	3	0	3	CC104	
CSP207A	Comp. Org. w/ Microcontroller	3	2	3	5	CC104	
CSP208	Software Engineering	3	3	0	3	CSP204A	
CSP209A	Game Prog. 1 - Introduction to Game Design and Development	3	2	3	5	CSP202	
CSP210A	Usability, HCI and User Design	3	0	3	3	CC105	
MATH3C	Analytical Geometry and Calculus	3	3	0	3		
PED4	Physical Education 4 (Individual and Dual Sports)	2	2	0	2		
NSTP2	National Service Training Program	3	3	0	3		
	Total	**26**	**21**	**9**	**30**		

THIRD YEAR

First Semester

Code	Title	Total Credit Units	No. of hrs Lec	No. of hrs Lab	Total Assessed Units	Pre-requisite	Co-requisite
CC106	Cloud-based Application Development	3	2	3	5	CC105	
CSP211	Automata Theory and Formal Languages	3	3	0	3	CSP206	
CSP212A	3D Animation	3	2	3	5	CSP209A	
CSP213	Game Prog. 2 - Advance Game Design and Development	3	2	3	5	CSP209A	
CSE301B	CS Elective 1 Technopreneurship	3	3	0	3		
USELF	Understanding Self	3	3	0	3		
GENSOC	Gender And Society	3	3	0	3		
IRS3	Spirituality in the Workplace	3	3	0	3		
	Total	**24**	**21**	**9**	**30**		

Second Semester

Code	Title	Total Credit Units	No. of hrs Lec	No. of hrs Lab	Total Assessed Units	Pre-requisite	Co-requisite
CSP214	Social Issues and Professional Practice	3	3	0	3		
CSP215A	Web Development Technologies	3	2	3	5	CC106	
CSP216	Programming Languages	3	3	0	3	CC104	
CSP217A	Thesis 1	3	3	0	3	CSP211, CSP210	
CSE302	CS Elective 2 - Game	3	2	3	5		
PSPEAK	Public Speaking	3	3	0	3		
MATH4PS	Probability and Statistics	3	3	0	3		
	Total	**21**	**19**	**6**	**25**		

Summer

Code	Title	Total Credit Units	No. of hrs Lec	No. of hrs Lab	Total Assessed Units	Pre-requisite	Co-requisite
CSP218A	Internship	6	0	0	6	3rd year Standing	
	Total	**6**	**0**	**0**	**6**		

FOURTH YEAR

First Semester		Total Credit requisite Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-
CSP219	Networks and Communications	3	2	3	5	CC103	
CSP220	Thesis 2	3	3	0	3	CSP217, 4th Year Standing	
CSP221A	Artificial Intelligence	3	2	3	5	CSP211	
CSP222A	Data Science	3	2	3	5	Math 4	
GBOOKS	Great Books	3	3	0	3		
RIZAL	Rizal's Life, Works, and Writings	3	3	0	3		
	Total	**18**	**15**	**9**	**24**		

Second Semester		Total Credit requisite Units	No. of hrs Lec	Lab	Total Assessed Units	Pre-requisite	Co-
CSP223	Operating System	3	3	0	3	CC104	
CSP224A	Information Assurance and Security	3	3	0	3	CC105	
CSP225	Mobile-based Application Development	3	2	3	5	CSP202	
CSP226	Emerging Trends in Computing	3	2	3	5		
CSE303A	CS Elective 3 – Machine Learning	3	2	3	5		
CWRLD	The Contemporary World	3	3	0	3		
RHIST	Readings in Philippine History	3	3	0	3		
	Total	**21**	**18**	**9**	**27**		

SUMMARY OF REQUIRED COURSES

BS Computer Science

		No. of Courses Required	Units Equivalent	Total Units
General Education Courses				
MATHMW	Mathematics in the Modern World		3	
PCOM	Purposive Communication		3	
STS	Science, Technology and Society		3	
CWRLD	The Contemporary World		3	
USELF	Understanding Self		3	
ARTAP	Art Appreciation		3	
RIZAL	Rizal's Life, Works, and Writings		3	
ETHICS	Ethics		3	
RHIST	Readings in Philippine History		3	27
Mathematics				
Math 1	College Algebra		3	
Math 2	Trigonometry		3	
Math 3	Calculus		3	
MATH4	Probability and Statistics		3	12
Other Non-Technical Courses				
IGG1	Group Guidance 1		3	
IRS1	Lasallian Spirituality		3	
IRS2	Christian Morality		3	
IRS3	Spirituality in the Workplace		3	12
Languages and Humanities				
LOGIC	Logic		3	
PSPEAK	Public Speaking in the Discipline		3	6
General Education Elective				
RVARTS	Reading Visual Art		3	
GBOOKS	Great Books		3	
GENSOC	Gender and Society		3	9
Physical Education				
PED1	Wellness and Fitness		2	
PED2	Team Sports and Rhythmic Activities		2	
PED3	Individual and Dual Sports		2	
PED4	Recreation and Water Safety		2	8
NSTP				
NSTP1	National Service Training Program 1		3	
NSTP2	National Service Training Program 2		3	6
CS Core Courses				
CC101	Computer Science Fundamentals		3	
CC102	Computer Programming 1		3	
CC103	Computer Programming 2		3	
CC104	Data Structures and Algorithms		3	
CC105	Information Management		3	
CC106	Cloud-based Application Development		3	18
CS Professional Courses				
CSP201	2D Game Art		3	
CSP202	Object Oriented Programming		3	
CSP203	Discrete Structures		3	
CSP204A	System Analysis and Design		3	
CSP205	Applied Math for Game		3	
CSP206	Analysis and Design of Algorithms		3	
CSP207A	Computer Org. with Microcontroller Prog.		3	
CSP208	Software Engineering		3	
CSP209A	Game Prog. 1 – Intro to Game Design and Dev		3	
CSP210A	Usability, HCI and User Interaction Design		3	
CSP211	Automata Theory and Formal Languages		3	

CSP212A	Automata Theory and Formal Languages	3	
CSP213	Game Prog. 2 – Advance Game Development	3	
CSP214	Web Development Technologies	3	
CSP215	Social Issues and Professional Practice	3	
CSP216	Programming Languages	3	
CSP217	Thesis 1	3	
CSP218	Internship	3	
CSP219	Thesis 2	3	
CSP220	Networks and Communications	3	
CSP221	Artificial Intelligence	3	
CSP222	Data Science	3	
CSP223	Operating System	3	
CSP224	Information Assurance and Security	3	
CSP225	Mobile-based Application Development	3	
CSP226	Emerging Trends in Computing	3	78
CS Electives			
CSE301	CS Elective 1 - Technopreneurship	3	
CSE302	CS Elective 2 - Game Development Technologies	3	
CSE303	CS Elective 3 – Machine Learning	3	9
	TOTAL		**185**

MAJOR COURSE DESCRIPTION

BS Computer Science

CC101   **3 units**
**COMPUTER   SCIENCE   FUNDAMENTALS
(LECTURE)**
This course provides an overview of the Computing Industry and Computing Profession, including Research and Applications in different fields, the key components of computer systems.

At the end of the course, the students are expected to put up an exhibit as part of an information awareness on the latest ICT software and hardware innovations, computer security and viruses.

CC102   **3 units**
**COMPUTER PROGRAMMING 1
(WITH LABORATORY)**
Problem solving using general purpose programming language. The emphasis is to train students to design, implement, test, and debug programs intended to solve computing problems using fundamental programming constructs.

At the end of the course, the students are expected to apply their skills and techniques to solve industry and societal problems by analyzing the requirement and implementing project prototypes.

CC103   **3 units**
**COMPUTER PROGRAMMING 2
(WITH LABORATORY)**
Problem solving using general purpose programming language. The emphasis is to train students to design, implement, test, and debug programs intended to solve computing problems using basic data structures and standard libraries

At the end of the course, the students are expected to apply their skills and techniques to solve industry and societal problems by analyzing the requirement and implementing project prototypes.

CC104   **units**
**DATA STRUCTURES AND
ALGORITHMS (LECTURE)**
The course covers the standard data representation and algorithms to solve computing problems efficiently (with respect to space requirements and time complexity of algorithm). This covers the following: Stacks, Queues, Trees, Graphs, Maps, and Sets. Thorough discussion of sorting and searching algorithms and hashing is covered.

At the end of the course, the students are expected to choose among which alternative data structure is most efficient to solve specific data- representation and algorithmic problems.

CC105   **3 units**
INFORMATION MANAGEMENT
                     (WITH LABORATORY)
This course covers information management, database design, data modeling, SQL, and implementation using a relational database system.

At the end of the course, the students are expected to model an application's data requirements using conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model using SQL.

CC106   **3 units**
CLOUD-BASED

                         **APPLICATIO
N DEVELOPMENT (WITH
LABORATORY)** Development of applications using web, mobile, and emerging technologies with emphasis on requirements management, interface design, usability, testing, deployment, including ethical and legal considerations.

At the end of the course, the students are expected to design a system and develop incorporating emerging technologies such as web and/or mobile technologies.

CSP201   **3
units**
**2D   GAME   ART   (WITH
LABORATORY)**
In this course, the fundamentals of animation (which includes timing, physics, and movement arcs) and design and production of 2D digital animation using appropriate   software   are   reviewed. Technique in preparing 2D assets for use in   games   will   be   covered   including automatic generation of 2D animation assets through programming. Students explore the range of possibilities and limitations of dynamic media and digital animation.

At the end of the course students will prepare game assets including character design, environment, game objects, animation and its behavior in terms of game art.

CSP202   **3 units**
**OBJECT ORIENTED PROGRAMMING
(WITH LABORATORY)**
Introduces students to the object-oriented programming paradigm using Java. It focuses on definition of classes along with the   fundamental   principles   of   object-oriented design such as data encapsulation, inheritance, and polymorphism.

Students are expected to describe simple abstract   data   types   and   design implementations,   using   abstraction functions to document them. Develop a program that applies technique of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.

CSP203   **3 units**
DISCRETE STRUCTURES (LECTURE)
The purpose of this course is to understand and use (abstract) discrete structures that are backbones of computer science. This course covers topics such as logic, proofs, sets, relations, functions, induction and recursion, discrete probability, and finite state machines with an emphasis on applications in computer science.

At the end of the course students develop the mathematical foundations necessary for more specialized subjects in computer science, including data structures, algorithms, and compiler design. Upon completion of this course, you will have the mathematical know-how required for an in- depth study of the science and technology of the computer age.

CSP204   **3 units**
SYSTEM ANALYSIS AND DESIGN (LECTURE) This course introduces established and evolving methodologies for the analysis, design, and development of an information system. Emphasis is placed on system characteristics, managing projects, prototyping, CASE/OOM tools, and systems development life cycle phases.

Upon completion, students should be able to submit a report which includes the analysis of a problem and the design of an appropriate solution using a combination of OOM tools and techniques.

CSP205   **3 units**
APPLIED MATH FOR GAMES (LECTURE)
This course covers the mathematics used in game development. Students will learn and develop a foundation for applications in collision detection and motion. Specific topics in vector algebra, matrixes, and analytical geometry and probability and statistics as applied to modelling and simulation.

At the end of this course, students are expected to develop a game using various mathematical equations and functions to represent behavior.

CSP206   **3 units**
ANALYSIS AND DESIGN OF ALGORITHMS (LECTURE)
This course enhances the critical thinking of the students because designing and analyzing algorithms in terms of time and space must be taken into consideration in any program. Designing an algorithm involves knowledge of the problem domain, a thorough knowledge of the data structures that are available and suitable and a good measure of creativity. The course will also cover useful algorithmic design techniques, the methods for analyzing algorithms, the divide and conquer strategy for designing searching and sorting algorithms.

Students are expected to identify appropriate algorithm to certain requirement and apply it in a running program. They are also expected to describe the behavior and running time of various

searching, sorting and graph algorithm. By doing so they will be thinking critically about the analysis and design of algorithm and ensure that they gain in-depth knowledge about programming as a practice profession in computer science.

CSP207A   3 units
COMP. ORG. W/ MICROCONTROLLER PROG. (WITH LABORATORY)
This course deals with an overview of the architecture and organization of a computer. It includes discussion of the Central Proccessing Unit, internal and external memory, Input/Output organization and peripherals. Mircocontroller assembly and programming will be introduced in in this course to familiarize students with basic in this type of techonolgy.

Students are expected to   discuss computer works,   both   internally and externally and identify the structures and functions of a computer system. They will be able to   create   programs and execute computer   interfacing   with   different electronic components.

CSP208   3 units
SOFTwARE   ENGINEERING (LECTURE)
It intends to provide an overview of the software engineering   process   and   the ethical   issues that influences the practice from requirements analysis and modeling, through software design fundamentals, to implementation of object- oriented models and programming, to software testing and quality   assurance,   and,   software maintenance.

By the end of the course, students are expected to develop a project by extracting user requirements, translate these to formal models and   present   using   UML-based visualization.   Prepare   comprehensive written   documentation   which   includes overall   architecture   of   the   system   and develop the system design to an actual running program.

CSP209A   3 units
GAME PROGRAMMING 1- INTRO TO GAME DESIGN   AND DEVELOPMENT   (WITH LABORATORY)
The course gives an overview of the game development process from conception to production. It also discusses a history of game development   here   and   abroad, and   exposure   to   the   positions, job responsibilities that each member of a game development team has along with the industry requirements for the creation of a game design document (GDD) and

technical design document (TDD).   Game design includes game play, storytelling, challenges, and basic interactive   design, which   includes   interface design, information design, and world interaction.

Students are expected to design a small casual   game   and   understand   the complexities in developing these projects and produce proper documentation (GDD and TDD).   The experience will be used as foundation for more advanced courses in the program.

CSP210A   **3 units**
USABILITY, HCI AND USER
INTERACTION DESIGN (LABORATORY)
The course focuses on imparting to students the techniques in making software more intuitive to use and hence making it easy for target users to learn its fundamental functions and features. It emphasizes the importance of user experience in system flow. This course includes the principles of human computer interaction and use interface design techniques.

Students are expected to create   and conduct a   simple usability test   for an existing software application and the use any IDE to create a simple application that supports a graphical user interface.

CSP211   **3 units**
AUTOMATA THEORY AND
              FORMAL LANGUAGES
(LECTURE)
This course is an introduction to the fundamental ideas and models underlying computing; finite automata, regular sets, regular languages and expressions, formal grammars and languages, pushdown automata, context-free grammars, compiler theory, undecidability and complexity theory.

At the end of the course, the students will be able to apply skillful reasoning as a guide to problem solving in automation adherence to the computer science standards. They will also develop proficiency in using reasoning as an application to thesis algorithms, a commitment to develop and maintain intellectual traits of the mind and habits of thought.

CSP212A   **3**
units
3D   ANIMATION   (WITH
LABORATORY)
In this course, students learn the fundamental concepts of 3D animation. Students are introduced to the different principles behind the creation of the 3D virtual world.   Students will be taught to design different computer-based
3D imagery and produce a simple 3D animation sequence using a 3D software. Use of scripting language to manipulate 3D animation sequences will also discuss.

By the end of this course, students are expected to create and design a 3D animation, using a 3D animation software, based on the specification provided. Students are also expected to create
3D   assets   for   game applications.

CSP213   **3 units**
GAME   PROGRAMMING   2
(WITH LABORATORY)
This course provides students with skills needed for game development using software environment of a game engine and its scripting language. The students will learn fundamental concepts for 2D environment, development roles, interactivity, audio and programming which are important aspects of a 2D game application.

![University of St. La Salle - BACOLOD]

This course concludes with the students having created their own complete arcade-style game and a basic understanding of how more advanced game creation tools and game engines work.

CSP214   **3 units**
SOCIAL ISSUES AND PROFESSIONAL PRACTICE (LECTURE)
This course studies the social impact, implications, and effects of computers, and the responsibilities of computer professionals in directing the emerging technology. Specific topics include an overview of the history of computing, computer applications and their impact, the computing profession, the legal and ethical responsibilities of professionals, and careers in computing.

The students are expected to put up an exhibit as part of an information awareness campaign about IT security and computer threats.

CSP215A   **3 units**
WEB DEVELOPMENT TECHNOLOGIES (WITH LABORATORY)
In this course, students will be familiar of the applications and tools being used in systems development. These applications may include framework, frontend tools, project management tools, version controls and other tools used all throughout the development process.

By the end of the course, in a group, students are expected to develop and present a system with the use of the technology discussed in this course all throughout the development process and prepare a document.

CSP216   **3 units**
PROGRAMMING LANGUAGES
(LECTURE) This course is an introduction to basic concepts in the design of programming languages. Comparative study of programming languages from both theoretical and applied viewpoints. Typical issues include syntax and semantics, scope and binding times, storage allocation, parameter-passing techniques, control structures, run-time representation of programs and data. Detailed examples from the imperative, functional, parallel, object-oriented, web ad logical programming paradigms. Students are expected to already be familiar with the C++ or Java programming languages. Examples of concepts will be presented using specific languages.

At the end of the course students will be familiar with the concepts that are commonly available in widely used programming languages that be used in the development of their thesis.

CSP217A   **3 units**
THESIS 1 (LECTURE)
This course provides the students with opportunities to synthesize their accumulated knowledge to explore topics which reflect their personal interests, future goals and levels of ability to develop computing solutions (game development). It intends to provide practical

experience in the whole process of development projects from analysis through design to implementation and testing.

At the end of the course, the students are required to submit a complete written proposal documentation comprising the first three (3) chapters of the thesis and conducted a successful proposal presentation before the panel members.

CSP218   3 units
INTERNSHIP
(LECTURE)
Aims to expose students to appropriate training sites equipped with the latest technologies and where current methodologies in software development are employed. The internship program is meant to provide students with an opportunity to complement their formal learning with practical knowledge, skills and desirable attitudes and to gain hands on experience in recognized Industry Partner.

After 162 hours of training with Industry Partner, students interning under mentorship of an IT Professional should be able to learn the importance of constant upgrading of knowledge and skills in order to remain competitive in this fast-changing filed; recognize, prioritize and complete assigned task ontime; develop skills in verbal, non-verbal
& written communication without neglecting respect for authority and the ideas & opinion of other people in the organization; and submit an Internship Portfolio that highlights a complete project or task such as a program or system created, a game conceptualized, web application or other similar outputs reflecting the technical skills they obtained during their internship experience and integrate the Lasallian Graduate Attributes in their reflection.
Prerequisite: 3rd   Year
Standing

CSP219   3 units
NETWORKS AND COMMUNICATIONS
(with Laboratory)
This course first introduces the fundamental building blocks that form a modern network, such as protocols, topologies, hardware, and network operating systems. It then provides in- depth coverage of the most important concepts in contemporary networking, such as TCP/IP, subnetting and security.

The students will be provided with a technical and operational overview of digital computer networks, the foundation for all modern information systems and services.

This will develop among them the capabilities on how to install, configure, and troubleshoot a computer network which are highly marketable and exciting skills.

CSP220A   3
UNITS THESIS 2 (LECTURE)
This course challenges students to proceed to computing solutions (game development) based on the approved thesis proposal. The project will demonstrate the students' ability to analyze, synthesize, evaluate information, design and develop a game.

At the end of the course, the students are required to submit a comprehensive written documentation comprising all chapters of the thesis and conducted a successful oral presentation before the panel members.

CSP221   3 units
ARTIFICIAL INTELLIGENCE (WITH LABORATORY)
The course is about the algorithm behind Artificial Intelligence in games. Solution for common algorithmic problems will be discussed and analyze. Focus will be primarily on single-player games for this course. It covers Knowledge Representation, Search Techniques (Uninformed, Informed, Adversarial) and an introduction to Machine Learning techniques (Supervised and Unsupervised) as applied in games.

At the end of the course students can be able to design and implement simulation model for specific game scenario.

CSP222   3 units
DATA SCIENCE (WITH LABORATORY)
This course introduces data science which covers techniques used to extract useful information from data. Data Science is a problem-solving and data analysis oriented subject which applies scientific techniques to solve practical problems in an interdisciplinary environment. This course covers an introduction to the topics such as Data Mining, Machine Learning, Information Visualization, Big Data and uses R or Python programming language. By the end of the course.

At the end of the course, students will develop a simple research that will use data science approach.

CSP223   3 units
OPERATING SYSTEM (LECTURE)
This course provides an introduction to the concepts, theories and components that serve as the basis for the design of the classical and modern Operating Systems. Topics include concepts on Computer and operating system structures, Process and memory management, Process synchronization and communication, Virtual memory management, Secondary Storage Management, File systems Management and Protection and Security.

Students will demonstrate competence and understanding of the concepts, structure and design of operating systems and its impact on application system design and performance.

CSP224   3 units
INFORMATION ASSURANCE AND SECURITY (LECTURE)
This course intended to provide students an introduction to information assurance from the perspective of web-based applications. The course covers fundamental concepts necessary to understand the threats to security and privacy as well as various defenses against those threats.

At the end of the course, the students are expected to examine the relationship between threats, vulnerabilities, countermeasures, attacks, compromises and remediation throughout the entire system life cycle; explain the key factors involved in the authentication and how they are used to verify identify and grant access to the system; and describe the legal and ethical considerations related to the handling and management of enterprise information assets.

CSP225   **3 units**
MOBILE-BASED
                    APPLICATIO
N DEVELOPMENT (WITH
LABORATORY)
This course is intended to provide students with a comprehensive understanding of the tasks related to the development of enterprise-level mobile applications. The course will focus on the creation of mobile solutions for adopted modern platforms/ framework, including major mobile operating systems.

At the end of the course, the students are expected to develop enterprise-level mobile solutions, by taking full advantage of the capabilities of the adopted platform/framework. Work with software/ hardware tools to develop, test and debug mobile applications.

CSP226   **3 units**
EMERGING TRENDS IN
                    COMPUTING (WITH
LABORATORY)
This course introduces various trends in computing which is significant to see the motivation behind these new innovations and foresee what the future is like when this new invention matures and widely used. This course may include IoT, advance data processing, new technology in software development, robotics, AI implementation and other emerging trends the moment this course will be offered.

The student is expected to apply and present in a prototype or in a case study the emerging trends being discussed in this course.

CS
ELECTIVES

CSE301   **3**
units
TECHNOPRENEURSHIP
(LECTURE)
This course covers the theories and principles of technopreneurship, development of IT business plan and management of IT business.

Students are expected to come up with a business model for an approved product or service that integrates all the concepts discussed in class. The business model should be logical and feasible with an emphasis on practical technology applications. The students should be able to defend their business model.

CSE302A   **3 units**
**CS ELECTIVE 2 - GAME
TECHNOLOGIES (with LABORATORY)**
This course covers the different tools and
devices in game development. Students are
able to utilize different application
programming interfaces (API's) such as
google play services, virtual reality,
augmented reality and motion sensors for
multi platform game development.

At the end of this course, the students are
expected to develop immersive game that
uses various game development API.

CSE303A   **3 units**
**CS ELECTIVE 2 – MACHINE
LEARNING (WITH LABORATORY)**
This course introduces machine learning
statistical pattern recognition. The course
will also discuss recent applications of
machine learning, such as to robotic
control, data mining, autonomous
navigation, bioinformatics, speech
recognition, and text and web data
processing. Topics may includes machine
learning algorithms, supervised learning
(generative/discriminative learning,
parametric/ nonparametric learning, neural
networks, and support vector machines);
unsupervised learning (clustering,
dimensionality reduction, kernel methods);
learning theory (bias/ variance tradeoffs; VC
theory; large margins); and reinforcement
learning and adaptive control. R or Python
programming language will be used in this
course.

At the end of the course, students will
develop a simple research that will utilize
machine learning technology.