Republic of the Philippines
Western Mindanao State University
COLLEGE OF COMPUTING STUDIES
Zamboanga City

ASSOCIATE IN COMPUTER TECHNOLOGY MAJOR IN APPLICATION DEVELOPMENT
LADDERIZED PROGRAM TO BS IN COMPUTER SCIENCE

Ladderized Curriculum with 2–year Associate in Computer Technology (ACT) with specialization in Applications Development (AppDev)
[In compliance with CMO No. 25, s. 2015 and CMO No. 13, s. 2021]
Effective SY 2023-2024

PROGRAM CURRICULAR PROSPECTUS

FIRST YEAR

First Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
CC 100	Introduction to Computing	None	2	1	3
CC 101	Computer Programming 1 (Fundamentals of Programming)	None	3	1	4
DS 111	Discrete Structures 1	None	3	0	3
CAS 101	Purposive Communication	None	3	0	3
MATH 100	Mathematics in the Modern World	None	3	0	3
HIST 100	Life and Works of Rizal	None	3	0	3
US 101	Understanding the Self	None	3	0	3
PATHFIT 1	Movement Competency Training	None	2	0	2
NSTP 1	CWTS 1 / LTS 1 / ROTC 1	None	3	0	3
		TOTAL	25	2	27

Second Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
CC 102	Computer Programming 2 (Intermediate Programming)	CC 101	3	1	4
OOP 112	Object-Oriented Programming	CC 101	2	1	3
WD 114	Web Development 1	CC 101	2	1	3
HCI 116	Human Computer Interaction	CC 101	3	0	3
DS 118	Discrete Structures 2	DS 111	3	0	3
HIST 101	Readings in Philippine History	None	3	0	3
STS 100	Science, Technology and Society	None	3	0	3
PATHFIT 2	Exercise-Based Fitness Activities	PATHFIT 1	2	0	2
NSTP 2	CWTS 2 / LTS 2 / ROTC 2	NSTP 1	3	0	3
		TOTAL	24	3	27

NOTE: 1 Laboratory Unit = _3_ number of contact hours

SECOND YEAR

First Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
CC 103	Data Structures and Algorithms	CC 102	2	1	3
CC 104	Information Management	CC 102, OOP 112	2	1	3
MAD 121	Mobile Application Development	CC 102, OOP 112	2	1	3
WD 123	Web Development 2	WD 114	2	1	3
SIPP 125	Professional Issues in Computing	CC 102	3	0	3
NC 127	Networks and Communications	CC 102	2	1	3
PATHFIT 3	Dance 1 / Sports 1 / Martial Arts 1 / Group Exercise 1 / Outdoor and Adventure Activities 1	PATHFIT 2	2	0	2
		TOTAL	15	5	20

Second Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
CC 105	Applications Development and Emerging Technologies	CC 104	2	1	3
ACTINT 122	ACT Internship (320 hours)	WD 123, SIPP 125	0	6	6
AO 124	Architecture and Organization	DS 111, CC 103	2	1	3
PHILCON	Philippine Constitution		3	0	3
CW 101	The Contemporary World		3	0	3
PATHFIT 4	Dance 2 / Sports 2 / Martial Arts 2 / Group Exercise 2 / Outdoor and Adventure Activities 2	PATHFIT 2	2	0	2
		TOTAL	12	8	20

Remarks: Students who completed the first two years of this curriculum, equivalent to 94 units, will be conferred with Associate in Computer Technology (ACT) with specialization in Applications Development (AppDev)

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CMOs for Integration	
CMO No. 1, S. 2015	US 101
CMO No. 1, S. 2019	HIST 101
CMO No. 2, S. 2019	HIST 101

ACT SUMMARY OF UNITS		
CHED Minimum Requirements		**Institutional Requirements**
A. General Education Courses		
Core Courses	**12**	**18**
Rizal Course	**3**	**3**
B. Professional Education Courses		
Core Common Courses	**15**	**17**
Specialization Courses	18	**30**
Professional Issues in Computing Courses	3	**3**
Internship	6	**6**
C. Courses Mandated by Law		
PATHFit	8	**8**
NSTP	6	**6**
D. Institutional Courses		
Philippine Constitution		**3**
TOTAL	**71**	**94**

Prepared by:

CEED JEZREEL B. LORENZO, MIT
Department Head ACT
(Signature over printed name)
Date: _____

Noted by:

RODERICK P. GO, PhD
College Dean
(Signature over printed name)
Date: _____

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Continuance of the *ACT major in Application Development program*
towards ***Bachelor of Science in Computer Science program***

Summer

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
AC 128	Algorithms and Complexity	DS 118, CC 103	3	0	3
PL 129	Programming Languages	CC 103	2	1	3
STAT 120	Statistics for Computer Science	MATH 100	3	0	3
		TOTAL	8	1	9

THIRD YEAR

First Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
SE 131	Software Engineering 1	CC 105, WD 123	2	1	3
ADS 133	Advanced Database Systems	CC 104	2	1	3
ATFL 135	Automata Theory and Formal Languages	AC 128, PL 129	3	0	3
OS 137	Operating Systems	AO 124	2	1	3
	CS Elective 1		2	1	3
	CS Elective 2		2	1	3
CALC 139	Calculus for Computer Science	None	3	0	0
		TOTAL	16	5	21

Second Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
ES 130	Embedded Systems	OS 137	2	1	3
SE 132	Software Engineering 2	SE 131	2	1	3
IAS 134	Information Assurance and Security	CC 104, OS 137	2	0	2
TW 136	Technical Writing for Computer Science	SE 131, ADS 133	0	1	1
	CS Elective 3		2	1	3
	GE Elective 1	None	3	0	3
	GE Elective 2	None	3	0	3
	GE Elective 3	None	3	0	3
		TOTAL	17	4	21

Summer

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
THESIS 139	CS Thesis 1	SE 132, TW 136	3	0	3
		TOTAL	3	0	3

FOURTH YEAR

First Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
THESIS 141	CS Thesis 2	THESIS 139	3	0	3
A&H 100	Art Appreciation	None	3	0	3
		TOTAL	6	0	6

Second Semester

Code	Descriptive Title	Prereq	Units		
			Lec	Lab	Total
CSPRAC 142	Practicum / Industry Immersion (162 hours)	THESIS 141	0	3	3
ETHICS 101	Ethics	None	3	0	3
		TOTAL	3	3	6

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---------- **Elective Track/s** ----------

General Education Electives		
Course Code	**Course Title**	**Number of Units**
SSP 104	The Entrepreneurial Mind***	3
SSP 103	Gender and Society***	3
MST 101	Environmental Science***	3
MST 102	People and the Earth's Ecosystems	3
A&H 104	Reading Visual Art	3

****Highly Recommended **Recommended*

Professional Education Electives		
Course Code	**Course Title**	**Number of Units**
CSE 131	Computational Science***	3
CSE 132	Intelligent Systems***	3
CSE 133	Parallel and Distributed Computing***	3
CSE 134	Graphics and Visual Computing	3
CSE 135	Systems Fundamentals	3

****Highly Recommended **Recommended*

CMOs for Integration	
CMO No. 1, S. 2015	US 101: Understanding the Self
CMO No. 1, S. 2019	HIST 101: Readings in Philippine History
CMO No. 2, S. 2019	HIST 101: Readings in Philippine History

TOTAL SUMMARY OF UNITS (ACT to BSCS)		
CHED Minimum Requirements		**Institutional Requirements**
A. General Education Courses		
Core Courses	**24**	**24**
Elective Courses	**9**	**9**
Life and Works of Rizal	**3**	**3**
B. Professional Education Courses		
Common Courses	**18**	**20**
CS Professional Courses	**48**	**50**
CS Professional Electives	**9**	**9**
Additional Math Requirements	**3**	**3**
Additional CS Professional Courses	**18**	**22**
C. Mandated Courses		
PATHFit	8	**8**
NSTP	6	**6**
D. Institutional Courses		
Philippine Constitution		**3**
Statistics for Computer Science		**3**
TOTAL	**146**	**160**

Prepared by:

CEED JEZREEL B. LORENZO, MIT
Department Head ACT
(Signature over printed name)
Date: _____

Noted by:

RODERICK P. GO, PhD
College Dean
(Signature over printed name)
Date: _____

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PROGRAM CURRICULAR PROSPECTUS

DESCRIPTION OF COURSES

Course Code	**CC 100**
Course Title	**Introduction to Computing**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	NONE
Course Description	This course provides an overview of computers, number system, data types and representations, digital logic systems, assembly and machine language, compliers and translator, operating system, and internet networking

Course Code	**CC 101**
Course Title	**Computer Programming 1 (Fundamentals of Programming)**
Units	*4 Units (3 units lec and 1 unit lab = 6 hours/week)*
Pre-Requisites	NONE
Course Description	This course introduces the students with the fundamental concepts of programming. It focuses on building the logical thinking skills with basic control structures of programming such as sequential, selective, and repetitive structures. Problem solving techniques are emphasized using pseudocode and flowcharts alongside the implemented program in C/C++ language.

Course Code	**DS 111**
Course Title	**Discrete Structures 1**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	NONE
Course Description	Discrete structures provide the basic concepts that serve as the foundation for computer science. This course will teach students how to think logically and mathematically. Students will study discrete or distinct separable elements and structures which are objects made by simpler objects or elements following a definite pattern. It will include topics on functions, sets, relations, basic logic, proof techniques, graphs and trees.

Course Code	**CC 102**
Course Title	**Computer Programming 2 (Intermediate Programming)**
Units	*4 Units (3 units lec, 1 unit lab = 6 hours/week)*
Pre-Requisites	CC 101
Course Description	This course introduces the students with the fundamental concepts of data structure and object-oriented programming. It focuses on building program logic based on object elements within a program. Problem solving techniques are emphasized using object hierarchy structure, relationships, polymorphism and object passing using C/C++ language.

Course Code	**OOP 112**
Course Title	**Object Oriented Programming**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 101
Course Description	This course provides the students with the knowledge on the fundamental concepts of object-oriented programming such as data abstraction, encapsulation, polymorphism, and inheritance. It gives emphasis on the object-oriented approach in the analysis and design of a computing solution following the Unified Modeling language (UML) standards. This course will train students to how to implement UML designs using any object-oriented programming language.

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Course Code	**WD 114**
Course Title	**Web Development 1**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 101
Course Description	This course focuses on web programming fundamentals and the basics of web development. It will enhance the web programming skills of the student. Through this course, student will learn to develop websites, web application and database-driven web applications.

Course Code	**HCI 116**
Course Title	**Human Computer Interaction**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	CC 101
Course Description	HCI is an interdisciplinary field that integrates theories and methodologies across many domains including cognitive psychology, neuro-cognitive engineering, computer science, human factors, and engineering design. In this course, fundamental theories, and concepts of human-computer interaction (HCI) will be introduced. Students will gain theoretical knowledge of and practical experience in the fundamental aspects of human perception, cognition, and learning as relates to the design, implementation, and evaluation of interfaces. Topics to be covered include interface design, usability evaluation, universal design, multimodal interfaces (touch, vision, natural language, and 3-D audio), virtual reality, and spatial displays. Also, the course will incorporate topics on gender in relation to human computer interaction. In addition to lectures, students will work on individual and team assignments to design, implement, and evaluate various interactive systems and user interfaces.

Course Code	**DS 118**
Course Title	**Discrete Structures 2**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	DS 111
Course Description	Discrete Structures 2 provide the advance concepts that serve as the foundation for computer science. This course will teach students how to think logically and mathematically. Students will study advance discrete or distinct separable elements and structures which are objects made by simpler objects or elements following a definite pattern. It will include topics on algorithm, cryptography, discrete probability, proof techniques, graphs and trees

Course Code	**CC 103**
Course Title	**Data Structures and Algorithms**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 102
Course Description	This course provides students with a modern introduction to logic design and the basic building blocks used in digital systems, in particular digital computers. It covers a discussion of logic gates, minimization techniques, arithmetic circuits, and modern logic devices. It also deals with sequential circuits such as flip-flops. Different representations including truth table, logic gates, and Karnaugh map will also be discussed.

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Course Code	**CC 104**
Course Title	**Information Management**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 102, OOP 112
Course Description	This course is an introduction to database management system concepts that provides a solid foundation of database technology and its implementation. The course covers fundamental concepts of database technology, such as the different approaches to database application development, conceptual and logical data models, physical database design, and an introduction to the structured query language. The laboratory class also introduces the students to the database management system as a tool that enables them to define, create, maintain, and control access to databases. The course also covers simple database application development using PHP with Database Programming Object-Relational Mapping Framework, and HTML and Web Design Frameworks for the front-end development of the application.

Course Code	**MAD 121**
Course Title	**Mobile Application Development**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 102, OOP 112
Course Description	This course provides the student the essential knowledge on building an android application. Combining idea and practice, this course gives students hands-on experience with the technology, tools, and techniques used to develop data-driven mobile software solutions for enterprise, computer aided instruction and other societal existing problems that needs a technological solution with the use of mobile application.

Course Code	**WD 123**
Course Title	**Web Development 2**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	WD 114
Course Description	This course focuses on web programming fundamentals and the basics of web development. It will enhance the web programming skills of the student. Through this course, student will learn to develop websites, web application and database-driven web applications. Also, they will be introduced to web design and other web technologies that is essential to their growth as a web developer.

Course Code	**SIPP 125**
Course Title	**Social Issues and Professional Practice**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	CC 102
Course Description	This course is an introduction to the theories and issues of ethical behavior as they relate to the demands of a rapidly changing information-oriented society. In particular, this course emphasizes ethical issues in business and information systems. It covers many aspects of ethical behavior in the workplace, including special issues encountered by computer users who are faced with challenges and behavioral interpretations never encountered prior to this new technology. Various ethical theories are introduced and discussed to provide a framework for understanding specific applications of ethics in information systems, and to give the students an opportunity to explore their ethical beliefs.

Course Code	**NC 127**
Course Title	**Networks and Communications**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 102
Course Description	The course introduces the fundamental concepts on data communication and the design, deployment, and management of computer networks. Upon completion, students should be

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PROGRAM CURRICULAR PROSPECTUS

	able to perform tasks related to networking mathematics, terminology, and models, media, Ethernet, and TCP/IP Protocols.

Course Code	**CC 105**
Course Title	**Applications Development and Emerging Technologies**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 104
Course Description	This course is intended for third year BS Computer Science student who has completed or passed the Information Management course. This course focuses on developing the skills of the students in machine learning, one of the top emerging technologies for the recent years. The course starts with developing the data engineering skills and the skills for designing machine learning models. This course will specifically use Python programming language and scikit-learn, the machine learning toolkit. The machine learning model will be deployed using Python Flask framework, a web framework that will create the front-end application.

Course Code	**ACTINT 122**
Course Title	**ACT Internship (320 hours)**
Units	*6 Units (18 lab hours/week)*
Pre-Requisites	WD 123, SIPP 125
Course Description	An immersion program wherein the students will have a chance and opportunity to be with the IT Industry. Students will have the chance to apply the skills, knowledge and attitude learned, and at the same time, can experience the corporate environment.

Course Code	**AO 124**
Course Title	**Architecture and Organization**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	DS 111, CC 103
Course Description	This course provides an overview of the architecture and organization of a computer, how it is built. It includes a discussion of the CPU, memory, I/O organization, and peripherals and also the internal number representation and arithmetic; computer structure and machine language; assembly language concept and assembly language instructions

Course Code	**CALC 126**
Course Title	**Calculus for Computer Science**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	MATH 100
Course Description	A course covering the concepts of functions, limits, and derivatives, including the differentiation of algebraic functions. This also covers topics on integration of mathematical expressions, including logarithms, exponents, trigonometric and inverse trigonometric identities.

Course Code	**AC 128**
Course Title	**Algorithms and Complexity**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	DS 118, CC 103
Course Description	A study on the design and analysis of algorithms, which introduces students to the techniques in basic algorithmic analysis, algorithmic strategies, graph algorithms, and geometric algorithms.

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Course Code	**PL 129**
Course Title	**Programming Languages**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 103
Course Description	This course will provide the students a solid foundation for understanding the fundamental concepts of programming languages. It introduces students to the main constructs of contemporary programming languages and critically evaluate existing and future programming languages. Students will be presented design issues for various language constructs, examining the design choices for these constructs in some of the most common languages, and critically comparing the design alternatives.

Course Code	**STAT 120**
Course Title	**Statistics for Computer Science**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	MATH 100
Course Description	

Course Code	**SE 131**
Course Title	**Software Engineering 1**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 105, WD 123
Course Description	This course provides an overview of the software engineering processes. Topics include project management and selection, feasibility study, requirement analysis, analysis modeling, project risk analysis, and software design fundamentals. This course also introduces students to project proposal guidelines and ethical issues in the IT field corresponds to the client needs

Course Code	**ADS 133**
Course Title	**Advance Database Systems**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	CC 104
Course Description	This course covers modern database and information systems as well as research issues in the field. It will cover selected topics on the traditional and object-oriented databases. It will also discuss the different database architectures such as client-server and distributed databases.

Course Code	**ATFL 135**
Course Title	**Automata Theory and Formal Languages**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	AC 128, PL 129
Course Description	This course introduces the formal models of computing and their relation to formal languages. The course will cover circuits in which the output depends not only on the input, but also on the state of the system at the time the input is introduced. These circuits, called sequential circuits, have memory and the state of the system is determined by previous processing. They are important in computer design. The course will discuss in detail finite-state machine, finite-state automata, and languages.

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Course Code	**OS 137**
Course Title	**Operating Systems**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	AO 124
Course Description	This course provides an overview of the internal operation of modern computer operating systems- the major components of most operating systems with emphasis on the four major operating system subsystem managers: Processor Management, Memory Management, Device Management, and File Management. The course covers the overall function of an OS – what they do, how they do it, how their performance can be evaluated, and how they compare with each other. A brief history of operating systems and their design and development will be discussed as well.

Course Code	**ES 130**
Course Title	**Embedded Systems**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	OS 137
Course Description	

Course Code	**SE 132**
Course Title	**Software Engineering 2**
Units	*3 Units (2 units lec, 1 unit lab = 5 hours/week)*
Pre-Requisites	SE 131
Course Description	This course is the continuation of Software Engineering 1 and focuses on system construction and testing. Topics include System Construction and Implementation, UI/UX Principles, Change Management, Version Control, Process Improvement, System Testing and Debugging, Quality Management, Software Evolution, System Operation and Management, and System Dependability and Security.

Course Code	**IAS 134**
Course Title	**Information Assurance and Security**
Units	*2 Units (2 lec hours/week)*
Pre-Requisites	CC 104, OS 137
Course Description	Discusses the set of controls and processes intended to protect and defend information and systems by ensuring their availability, integrity authentication and confidentiality.

Course Code	**TW 136**
Course Title	**Technical Writing for Computer Science**
Units	*1 Unit (3 lab hours/week)*
Pre-Requisites	SE 131, ADS 133
Course Description	

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Course Code	**THESIS 139**
Course Title	**CS Thesis 1**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	SE 132, TW 136
Course Description	The subject focuses on providing the students with the proper foundation to propose and conduct theoretical and empirical research to answer a broad array of questions related to the focused on the theories and concepts of computer science such as the development of software technologies in support of other computing solutions. The proposed development of the software system should involve algorithm- based research and development and anchored on computer science principles. Software systems include, but are not limited to: • mobile computing systems • software extensions or plug-ins • expert systems • decision support systems • game development • computer vision • image/signal processing • natural language processing • pattern recognition and data mining • bioinformatics • modelling and simulation • software extensions or plug-ins • expert systems • decision support systems • Intelligent Systems • graphics applications • human-computer interaction/ affective computing/emphatic computing • cloud computing • parallel computing • embedded systems • emerging technologies

Course Code	**THESIS 141**
Course Title	**CS Thesis 2**
Units	*3 Units (3 lec hours/week)*
Pre-Requisites	THESIS 139
Course Description	

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Course Code	**CSPRAC 142**
Course Title	**Practicum / Industry Immersion (162 hours)**
Units	*3 Units (9 lab hours/week)*
Pre-Requisites	THESIS 141
Course Description	This is a 3-unit laboratory course for the BS Computer Science program that is designed to provide students work experience in order to develop the necessary skills and work ethics in the actual field of work as well as train students on the importance of efficiency and productivity. This course program allows student to apply their knowledge of the concepts and theories in an actual working environment. It will not only focus on the development of information systems, web applications, or instructional content, specifically in the following areas of development: Requirements Definition and Analysis, System Design or Instructional Design, Program Design and Implementation (Coding), Software Quality Assurance or System Testing, and System Delivery and Maintenance inclusive of Training & Delivery of Manuals but also in the maintenance of an existing systems in the workplace where they are, or assisting in the preparation/dissemination of information regarding the institution where they are.