Program Guidebook

Bachelor of Science, Computer Science

Program Code: **MSCSUG** Catalog Version: **202504** Published Date: **12/12/2024**

Students enrolled in the Accelerated Computer Science Bachelor's and Master's Degree program will first complete the Bachelor of Science in Computer Science portion of the program, and after completing the necessary bachelors and bridge course work will receive the Bachelor of Science, Computer Science degree. Students will then progress to the remaining graduate course work, and upon completion will receive the Master of Science, Computer Science degree. The Bachelor of Science in Computer Science prepares students for a career in the high demand field of Computer Science. Upon program completion, students will apply their learned knowledge and skills in the designing, developing and optimizing of systems to meet current and future industry needs. The curriculum includes innovative courses in programming and logic, architecture and systems, data structures, artificial intelligence, along with the theory and science of computing. The Master of Science in Computer Science is a competency-based degree program that represents a path for successful IT professionals to launch their careers and build them to an executive level. The graduate will advance his or her knowledge and skills through a practical, real-world program based on sound principles of Computer Science revolving around three primary themes: computing systems, human-computer interaction, and artificial intelligence and machine learning: effective communication as essential to management at all levels, in all areas of human endeavor; and strategic vision that takes individuals and organizations beyond immediate difficulties and successes to a perception of future challenges and preparations to meet those challenges.

Understanding the Competency-Based Approach

Practically speaking, how do competency-based programs like those offered at Western Governors University (WGU) work? Unlike traditional universities, WGU does not award degrees based on completion of a certain number of credit hours or a certain set of required courses. Instead, you will earn your degree by demonstrating your skills, knowledge, and understanding of important concepts.

Progress through a degree program is governed not by the amount of time you spend in class but by your ability to demonstrate mastery of competencies as you complete required courses. Of course, you will need to engage in learning experiences as you review competencies or develop knowledge and skills in areas in which you may be weak. To help you acquire the knowledge and skills you need to complete your courses and program, WGU provides a rich array of learning resources. Your program mentor will work closely with you to help you understand the competencies required for your program and to help you create a schedule for completing your courses. You will also work closely with course instructors as you engage in each of your courses. As subject matter experts, course instructors will guide you through the content you must master to pass the course assessments.

The benefit of this competency-based system is that it enables students who are knowledgeable about a particular subject to make accelerated progress toward completing a degree, even if they lack college experience. You may have gained skills and knowledge of a subject while on the job, accumulated wisdom through years of life experience, or already taken a course on a particular subject. WGU will award your degree based on the skills and knowledge that you possess and can demonstrate—not the number of credits hours on your transcript.

Accreditation

Western Governors University is the only university in the history of American higher education to have earned initial accreditation from multiple regional accrediting commissions at once—earning simultaneous accreditation from ACCJC, HLC, NWCCU, and WASC. The university's accreditation from the Northwest Commission on Colleges and Universities (NWCCU) was reaffirmed in March of 2024. In addition to institution-level accreditation, each school has at least one program that is accredited by a programmatic accreditation. All programmatic accreditations are managed by the Academic Engagement department. Contact compliance@wgu.edu for additional information.

The Degree Plan

The focus of your program is your personalized Degree Plan. The Degree Plan is a detailed blueprint of the courses you will need to complete in order to earn your degree. The Degree Plan also lays out the accompanying learning resources and assessments that compose your program. The list of courses in the Degree Plan is often referred to as the standard path. The amount of time it takes to complete your program depends on both the amount of new information you need to learn and the amount of time you plan to devote each week to study. Your program mentor and course instructors will help you assess your strengths and development needs to establish a study plan.

Students vary widely in the specific skills and information they need to learn. For example, some students may be highly knowledgeable in a particular subject matter and would not need to engage in new learning opportunities. Other students may find that portions of the program require them to learn new information and that they need to take an online class or participate in a study module to acquire the knowledge and skills needed to fulfill program competencies in that area. Some individuals may be able to devote as little as 15–20 hours per week to the program, while others may need to devote more time. For this reason, pre-assessments are there to help your program mentor form a profile of your prior knowledge and create a personalized Degree Plan.

How You Will Interact with Faculty

At WGU, faculty serve in specialized roles, and they will work with you individually to provide the guidance, instruction, and support you will need to succeed and graduate. As a student, it is important for you to take advantage of this support. It is key to your progress and ultimate success.

Upon your enrollment, you will be assigned a program mentor—an expert in your field of study who will provide you with regular program-level guidance and support from the day you start until the day you graduate. Your program mentor will set up regular telephone appointments (weekly at first) with you, which you will be expected to keep. The mentor will review program competencies with you and work with you to develop a plan and schedule for your coursework. Your program mentor will serve as your main point of contact throughout your program—helping you set weekly study goals, recommending specific learning materials, telling you what to expect in courses, and keeping you motivated. In addition to regular calls, your program mentor is available to help you resolve questions and concerns as they arise.

For many of the courses at WGU, you will be required to complete performance assessments. These include reports, papers, presentations, and projects that let you demonstrate your mastery of the required competencies. A separate group of faculty members, called evaluators, will review your work to determine whether it meets requirements. Evaluators are also subject matter experts in their field of evaluation. If your assessment needs further work before it "passes," these evaluators, who review your work anonymously, will provide you with instructional feedback to help you meet evaluation standards and allow you to advance.

Connecting with Other Mentors and Fellow Students

As you proceed through your Degree Plan, you will have direct contact with multiple faculty members. These communications can take a variety of forms, including participation in one-on-one discussions, chats in the learning communities, and live cohort and webinar opportunities. As a WGU student, you will have access to your own personal MyWGU Student Portal, which will provide a gateway to your courses of study, learning resources, and learning communities where you will interact with faculty and other students.

The learning resources in each course are specifically designed to support you as you develop competencies in preparation for your assessments. These learning resources may include reading materials, videos, tutorials, cohort opportunities, community discussions, and live discussions that are guided by course instructors who are experts in their field. You will access your program community during your orientation course to network with peers who are enrolled in your program and to receive continued support through professional enrichment and program-specific chats, blogs, and discussions. WGU also provides Student Services associates to help you and your program mentor solve any special problems that may arise.

Orientation

The WGU Orientation course will introduce you to the fundamentals of WGU's competency-based education (CBE) and the expectations, policies, and protocols for students enrolled in a WGU degree program. Orientation will introduce you to WGU's wide range of support resources and success centers. It also will provide you with study strategies recommended by current students and faculty that will help you succeed as a WGU student. Orientation ends with your first assessment at WGU, providing an opportunity to experience WGU's performance assessment process before you begin your degree-focused coursework. The Orientation course must be completed before you can start your first term at WGU.

Transferability of Prior College Coursework

Because WGU is a competency-based institution, it does not award degrees based on credits but rather on demonstration of competency. WGU undergraduate programs may accept transfer credits or apply a Requirement Satisfied (RS) in some cases. Refer to your specific program transfer guidelines to determine what can be satisfied by previously earned college credits. Students entering graduate programs must have their undergraduate degree transcripts verified before being admitted to WGU. In addition to a program's standard course path, there may be additional state-specific requirements.

[Click here for the Student Handbook](#)

WGU does not waive any requirements based on a student's professional experience and does not perform a "résumé review" or "portfolio review" that will automatically waive any degree requirements. Degree requirements and transferability rules are subject to change in order to keep the degree content relevant and current.

Remember, WGU's competency-based approach lets you take advantage of your knowledge and skills, regardless of how you obtained them. Even when you do not directly receive credit, the knowledge you possess may help you accelerate the time it takes to complete your degree program.

Continuous Enrollment, On Time Progress, and Satisfactory Academic Progress

WGU is a "continuous enrollment" institution, which means you will be automatically enrolled in each of your new terms while you are at WGU. Each term is six months long. Longer terms and continuous enrollment allow you to focus on your studies without the hassle of unnatural breaks between terms that you would experience at a more traditional university. At the end of every six-month term, you and your program mentor will review the progress you have made and revise your Degree Plan for your next six-month term.

WGU requires that students make measurable progress toward the completion of their degree programs every term. We call this "On-Time Progress," denoting that you are on track and making progress toward on-time graduation. As full-time students, graduate students must enroll in at least 8 competency units each term, and undergraduate students must enroll in at least 12 competency units each term. Completing at least these minimum enrollments is essential to On-Time Progress and serves as a baseline from which you may accelerate your program. We measure your progress based on the courses you are able to pass, not on your accumulation of credit hours or course grades. Every time you pass a course, you are demonstrating that you have mastered skills and knowledge in your degree program. For comparison to traditional grading systems, passing a course means you have demonstrated competency equivalent to a "B" grade or better.

WGU assigns competency units to each course in order to track your progress through the program. A competency unit is equivalent to one semester credit of learning. Some courses may be assigned 3 competency units while others may be as large as 12 competency units.

Satisfactory Academic Progress (SAP) is particularly important to students on financial aid because you must achieve SAP in order to maintain eligibility for financial aid. We will measure your SAP quantitatively by reviewing the number of competency units you have completed each term. In order to remain in good academic standing, you must complete at least 66.67% of the units you attempt over the length of your program—including any courses you add to your term to accelerate your progress. Additionally, during your first term at WGU you must pass at least 3 competency units in order to remain eligible for financial aid. We know that SAP is complex, so please contact a financial aid counselor should you have additional questions. *Please note: The Endorsement Preparation Program in Educational Leadership is not eligible for federal financial aid.

Courses

Your Degree Plan includes courses needed to complete your program. To obtain your degree, you will be required to demonstrate your skills and knowledge by completing the assessment(s) for each course. In general there are two types of assessments: performance assessments and objective assessments. Performance assessments contain, in most cases, multiple scored tasks such as projects, essays, and research papers. Objective assessments include multiple-choice items, multiple-selection items, matching, short answer, drag-and-drop, and point-and-click item types, as well as case study and video- based items. Certifications verified through third parties may also be included in your program. More detailed information about each assessment is provided in each course of study.

Learning Resources

WGU works with many different educational partners, including enterprises, publishers, training companies, and higher educational institutions, to provide high-quality and effective learning resources that match the competencies you are developing. These vary in type, and may be combined to create the best learning experience for your course. A learning resource can be an e-textbook, online module, study guide, simulation, virtual lab, tutorial, or a combination of these. The cost of most learning resources are included in your tuition and Learning Resource Fee. They can be accessed or enrolled for through your courses. Some degree-specific resources are not covered by your tuition, and you will need to cover those costs separately. WGU also provides a robust library to help you obtain additional learning resources, as needed.

Mobile Compatibility:

The following article provides additional details about the current state of mobile compatibility for learning resources at WGU.

[Student Handbook article: Can I use my mobile device for learning resources?](#)

Standard Path

As previously mentioned, competency units (CUs) have been assigned to each course in order to measure your academic progress. If you are an undergraduate student, you will be expected to enroll in a minimum of 12 competency units each term. Graduate students are expected to enroll in a minimum of 8 competency units each term. A standard plan for a student for this program who entered WGU without any transfer units would look similar to the one on the following page. Your personal progress can be faster, but your pace will be determined by the extent of your transfer units, your time commitment, and your determination to proceed at a faster rate.

Standard Path *for* Bachelor of Science, Computer Science

Course Description	CUs	Term
Introduction to Computer Science	4	1
Applied Probability and Statistics	3	1
Formal Languages Overview	3	1
Data Management - Foundations	3	1
Network and Security - Foundations	3	2
Calculus I	4	2
Web Development Foundations	3	2
Data Management - Applications	3	2
Version Control	1	3
Practical Applications of Prompt	2	3
Scripting and Programming - Applications	4	3
Introduction to Systems Thinking and Applications	3	3
Discrete Mathematics I	4	3
Introduction to Communication: Connecting with Others	3	4
Computer Architecture	3	4
Natural Science Lab	2	4
Java Fundamentals	3	4
Discrete Mathematics II	4	4

Composition: Successful Self-Expression	3	5
American Politics and the US Constitution	3	5
Java Frameworks	3	5
Linux Foundations	3	5
Fundamentals of Information Security	3	5
Back-End Programming	3	6
Operating Systems for Computer Scientists	3	6
Advanced Java	3	6
Ethics in Technology	3	6
Applied Algorithms and Reasoning	3	6
Business of IT - Applications	4	7
Software Engineering	4	7
Health, Fitness, and Wellness	4	7
Data Structures and Algorithms II	4	7
Software Design and Quality Assurance	3	8
Introduction to AI for Computer Scientists	2	8
Artificial Intelligence Optimization for Computer Scientists	3	8
Artificial Intelligence and Machine Learning Foundations	3	8

Computer Science Project Development with a Team	3	8
Total CUs	115	

Changes to Curriculum

WGU publishes an Institutional Catalog, which describes the academic requirements of each degree program. Although students are required to complete the program version current at the time of their enrollment, WGU may modify requirements and course offerings within that version of the program to maintain the currency and relevance of WGU's competencies and programs. When program requirements are updated, students readmitting after withdrawal from the university will be expected to re-enter into the most current catalog version of the program.

Areas of Study for Bachelor of Science, Computer Science

The following section includes the areas of study in the program, with their associated courses. Your specific learning resources and level of instructional support will vary based on the individual competencies you bring to the program and your confidence in developing the knowledge, skills, and abilities required in each area of the degree. The Degree Plan and learning resources are dynamic, so you need to review your Degree Plan and seek the advice of your mentor regarding the resources before you purchase them.

Computer Science

Introduction to Computer Science

Introduction to Computer Science introduces learners to the field of computer science and its essential concepts. In this course students will explore, among other topics, programming basics through language-agnostic pseudocode, computational thinking and problem-solving, algorithms, hardware, and social and ethical considerations in the field. This course is designed for beginners to gain a solid understanding of computer science principles and their applications and prepare students for further study in the field. There are no prerequisites for this course.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner applies computer science principles to real-world scenarios, using scientific inquiry and higher-order critical thinking skills to solve problems.*
- *The learner explains pseudocode and the mathematics representation of simple algorithms to provide a comprehensive understanding of the computational processes involved.*
- *The learner identifies common programming constructs, variables, data types, functions, and operators.*
- *The learner identifies the components of different operating systems.*
- *The learner identifies the computer architectures and components encompassing a broad range of devices beyond traditional PCs.*

Formal Languages Overview

Formal Languages Overview introduces students to programming language design and theory, focusing on formal semantics and type systems. It covers imperative, functional, and parallel languages, emphasizing techniques for proving language properties and verifying program specifications. Students will differentiate between functional and procedural languages, and explore compiled, interpreted, query, and assembly languages. The course also examines the structure and features of programming languages, including object-oriented programming principles. Learners will understand program correctness, testing, and verification, addressing type correctness. This course prepares students to assess programming languages against business requirements, enhancing software reliability and efficiency. Aimed at those interested in the theoretical underpinnings of programming languages, it equips students with knowledge to make informed decisions in software development and application.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner applies techniques for proving language properties and verifying program specifications to enhance the reliability and efficiency of software.*
- *The learner explains the history, formal semantics, and type systems for different programming language types.*

Practical Applications of Prompt

The Practical Applications of Prompt course introduces learners to generative artificial intelligence (AI). This course aims to allow learners to gain skills for writing effective prompts and develop more effective conversations with artificial intelligence. Practical Applications of Prompt will lead learners to explore why prompt engineering is necessary. The course also aims to help learners, regardless of background, increase prompt fluency, which is fluency in using prompt effectively. The course teaches learners how to create effective prompts to elicit information with consideration of scope, specificity, and context; additionally, it teaches learners to evaluate the medium of the prompt and adjust prompts to output relevant

results. The last section of the course focuses on ways to evaluate the efficacy of prompts and improve the depth and quality of analytical investigations. This approach prepares students to navigate the complexities of working with generative AI and use these skills effectively throughout their careers.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *Learners create effective prompts with the consideration of scope, specificity, and context to elicit targeted information.*
- *Learners evaluate the efficacy of writing different prompts on research outcomes and improve the depth and quality of their analytical investigations.*
- *Learners evaluate the images, texts, and sound of the prompt and adjust prompts to output relevant results.*
- *Learners explain why prompt engineering is necessary.*

Computer Architecture

Computer Architecture introduces students to concepts and characteristics of organization and architecture applied to modern computer systems including performance, processor, memory, input/output, and multiprocessors to optimize system design, performance, and efficiency.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate analyzes computer architecture choices affecting information system solutions in order to effectively communicate and apply design considerations within an organization.*
- *The graduate analyzes the purpose and function of the operating system and how it interacts with the computer architecture.*
- *The graduate assesses the impacts of hardware and software design choices (i.e., cost, performance, optimization techniques, power consumption, size, compatibility, etc.) to improve quality and capabilities.*
- *The graduate evaluates characteristics of computer architecture to meet business objectives.*
- *The graduate evaluates performance of hardware and software interaction to maximize system capabilities.*

Applied Algorithms and Reasoning

This course builds on foundational knowledge of algorithm design and optimization for efficient resource utilization. It emphasizes benchmarking algorithms, reasoning, and the application of Big O notation for performance evaluation. Students will learn to design, analyze, and implement algorithms to solve complex computational problems, focusing on optimizing performance and enhancing system efficiency. The practical applications in this course involve testing data structures, developing algorithmic solutions, and optimizing algorithm performance through critical analysis and implementation. By integrating computational thinking and engineering principles, students will gain the skills to develop and optimize algorithms for real-world software, using benchmarking and profiling tools to measure and enhance performance.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner designs algorithms to optimize performance and resource utilization for various computational tasks.*
- *The learner implements diverse algorithmic techniques to solve complex computational problems.*
- *The learner optimizes algorithm performance through analysis and implementation enhancements.*

Data Structures and Algorithms II

Data Structures and Algorithms II explores the analysis and implementation of high-performance data structures and supporting algorithms, including graphs, hashing, self-adjusting data structures, set representations, and dynamic programming. The course also introduces students to NP-complete problems. The course discusses how to use Python techniques to implement software solutions for problems of memory management and data compression. This course has two prerequisites: Data Structures and Algorithms I and Discrete Math II.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course*

plan together.

- *The graduate creates software applications that incorporate non-linear data structures for efficient and maintainable software.*
- *The graduate evaluates computational complexity theories in order to apply models to specific scenarios.*
- *The graduate evaluates the space and time complexity of self-adjusting data structures using big-O notation to improve the performance of applications.*
- *The graduate incorporates dictionaries and sets in order to organize data into key-value pairs.*
- *The graduate writes code using hashing techniques within an application to perform searching operations.*
- *The graduate writes code using self-adjusting heuristics to improve the performance of applications.*

Introduction to AI for Computer Scientists

Introduction to AI for Computer Scientists provides an overview of critical terminology and key concepts for artificial intelligence (AI). The course explores the history and evolution of AI, elements of code, and the process for understanding algorithmic approaches to AI. The course presents topics of bias, ethical issues, and security concerns. Contextualized examples offer students an opportunity to see these concepts in professional scenarios; identifying issues within code, understanding the steps within an AI design, and understanding the different features, limitations, and benefits for a multitude of AI applications.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner describes types of artificial intelligence for decision-making in real-world applications.*
- *The learner identifies suitable data sources and explains the techniques of data collection, data wrangling, and data cleaning to implement the AI/ML data model.*
- *The learner identifies the difference between reasoning and knowledge through a step-by-step representation in AI.*

Artificial Intelligence Optimization for Computer Scientists

Artificial Intelligence Optimization for Computer Scientists guides students through the implementation and optimization of artificial intelligence (AI) solutions for various applications. Through extensive research, students will explore different AI approaches and determine the most applicable solutions for specific scenarios. Practical, hands-on exercises will enable students to implement and rigorously test AI solutions, thus honing their skills in optimizing AI models for enhanced performance and efficiency. Additionally, this course delves into creating data assumptions and interpretations that are crucial for predictive analytics and future data forecasting. Finally, students will adapt and extend AI solutions to address diverse application scenarios, ensuring their readiness to tackle real-world challenges in AI optimization and deployment. Introduction to Artificial Intelligence for Computer Scientists is a prerequisite to this course.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner adapts an AI-optimized solution for additional applications.*
- *The learner creates assumptions and interpretations of data to assist in the future prediction of data.*
- *The learner implements and tests artificial intelligence (AI) solutions.*
- *The learner optimizes artificial intelligence (AI) solutions.*

Artificial Intelligence and Machine Learning Foundations

Artificial Intelligence and Machine Learning Foundations explores foundational concepts and practical applications of Artificial Intelligence (AI) and Machine Learning (ML). It provides students with an understanding of the historical context and evolution of AI and the subsequent growth phases of AI technologies. Students will investigate the computational theories and logical frameworks that have shaped the AI landscape, examining how advancements in hardware have enabled the leap from basic machine learning to the complexities of deep learning. The course emphasizes the practicalities of AI and ML. Students will gain insights into the critical role of data integrity and the techniques for data wrangling to feed into ML algorithms effectively. In addition to the technical skills, the course incorporates a focus on the societal implications of AI and ML,

discussing current ethical considerations. This course aims to create a nuanced understanding of AI and ML, preparing students to thoughtfully consider the broader impacts of these technologies. There are no prerequisites for this course.

This course covers the following competencies:

- *The learner analyzes artificial intelligence and machine learning capabilities.*
- *The learner applies artificial intelligence and machine learning algorithms to solve diverse real-world problems.*
- *The learner evaluates the ethical implications of artificial intelligence and machine learning technologies.*
- *The learner optimizes artificial intelligence systems for enhanced performance and efficiency.*
- *The learner prepares data for use in machine learning.*

Computer Science Project Development with a Team

Computer Science Project Development with a Team has students prepare a prior project for submission to a mock technical and executive leadership team. This course expands on the coding work done in a previous course, asking students to submit three artifacts. The final artifact is a business proposal aimed at convincing stakeholders to implement the project, which includes an executive summary of product requirements directed at the IT audience, as well as a technical report of the fully functional data product intended to solve a real-world problem. Artifacts are evaluated by peer team members prior to submission, and students practice giving, receiving, and integrating feedback into their work process.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner creates a project proposal to convince stakeholders to implement the system.*
- *The learner creates a technical report for a fully functional data product to solve real-world scenarios.*
- *The learner creates an executive summary of product requirements directed to IT professionals.*

General Education

Applied Probability and Statistics

Applied Probability and Statistics is designed to help students develop competence in the fundamental concepts of basic statistics including: introductory algebra and graphing; descriptive statistics; regression and correlation; and probability. Statistical data and probability are often used in everyday life, science, business, information technology, and educational settings to make informed decisions about the validity of studies and the effect of data on decisions. This course discusses what constitutes sound research design and how to appropriately model phenomena using statistical data. Additionally, the content covers simple probability calculations, based on events that occur in the business and IT industries. No prerequisites are required for this course.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate applies principles and methods of probability-based mathematics to explain and solve problems.*
- *The graduate applies the operations, processes, and procedures of basic algebra to evaluate quantitative expressions, and to solve equations and inequalities.*
- *The graduate applies the operations, processes, and procedures of fractions, decimals, and percentages to evaluate quantitative expressions.*
- *The graduate evaluates categorical and quantitative data pertaining to a single variable using appropriate graphical displays and numerical measures.*
- *The graduate evaluates the relationship between two quantitative variables through correlation and regression.*
- *The graduate evaluates the relationship between two variables through interpretation of visual displays and numerical measures.*

Calculus I

This course guides candidates to apply theoretical concepts of calculus to real-world situations, demonstrating a developing mathematical mindset. This course focuses on limits, derivatives, integrals, and differential equations; it also prepares students for Discrete Mathematics. Prerequisites may include an entrance exam that assesses pre-calculus skills, or readiness; alternatively, completion of pre-calculus within the past 3 – 5 years.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate analyzes derivatives and their properties.*
- *The graduate analyzes integrals and their properties.*
- *The graduate determines a limit numerically, algebraically, and graphically.*
- *The graduate solves differential equations.*

Introduction to Systems Thinking and Applications

Introduction to Systems Thinking and Applications provides learners with the skills required to engage in a holistic systems-based approach to analyzing complex problems and solutions. This course introduces the foundational concepts and principles of systems thinking and provides opportunities to use a systems thinking approach to analyze and evaluate real-world case studies. The course will culminate with using systems thinking to develop a solution to an authentic complex problem. This course has no prerequisites, but general education math (C955 or C957) is preferred. Because the course is self-paced, learners may move through the material as quickly or as slowly as needed, with the goal of demonstrating proficiency in the five competencies covered in the final assessment. If learners have no prior knowledge of this material, they can expect to spend 30 to 40 hours on the course content.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner analyzes complex problems and solutions using a systems thinking methodology.*
- *The learner applies the basic principles and foundational theory of systems thinking to a scenario.*
- *The learner designs a solution to a complex problem using systems thinking.*

Discrete Mathematics I

Discrete Mathematics I helps candidates develop competence in the use of abstract, discrete structures fundamental to computer science. In particular, this course will introduce candidates to logic and proofs; Boolean algebra and functions; set theory; finite and infinite sequences and series; and relations, graphs, and trees. The course emphasizes applications in computer science. Calculus I is a prerequisite for this course.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate analyzes finite and infinite series.*
- *The graduate analyzes graphs, trees, and the associated data point connections.*
- *The graduate analyzes mathematical problems using relations.*
- *The graduate analyzes relationships between sets and functions.*
- *The graduate evaluates the truth of statements using proofs and the principles of deductive logic.*
- *The graduate minimizes circuits using Boolean algebra and Boolean functions.*
- *The graduate performs matrix operations.*

Introduction to Communication: Connecting with Others

Welcome to Introduction to Communication: Connecting with Others! It may seem like common knowledge that communication skills are important, and that communicating with others is inescapable in our everyday lives. While this may appear simplistic, the study of communication is actually complex, dynamic, and multifaceted. Strong communication skills are invaluable to strengthening a multitude of aspects of life. Specifically, this course will focus on communication in the professional setting, and present material from multiple vantage points, including communicating with others in a variety of contexts, across situations, and with diverse populations. Upon completion, you will have a deeper understanding of both your own and others' communication behaviors, and a toolbox of effective behaviors to enhance your experience in the workplace.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course*

plan together.

- *The learner implements appropriate communication styles based on audience and setting.*
- *The learner uses communication strategies for managing conflict.*
- *The learner uses communication strategies to influence others.*

Natural Science Lab

This course provides students an introduction to using the scientific method and engaging in scientific research to reach conclusions about the natural world. Students will design and carry out an experiment to investigate a hypothesis by gathering quantitative data. They will also research a specific ecosystem using academic sources and draw conclusions from their findings.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate accurately executes the process of scientific inquiry through experimentation in the natural world.*
- *The graduate draws conclusions based on academic research and scientific inquiry.*
- *The graduate evaluates academic sources for their credibility and relevance to a chosen research topic on a natural world phenomenon.*

Discrete Mathematics II

Discrete Mathematics II addresses abstract, discrete, computational methods used in computer science. In particular, this class introduces searching and sorting algorithms; big-O estimates; number theory and cryptography; recursion and induction; counting and advanced counting techniques; discrete probability; and modeling computation. This course emphasizes applications in computer science. Discrete Mathematics I is a prerequisite for this course.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate analyzes linear algorithms and associated big-O estimates.*
- *The graduate analyzes mathematical problems using discrete probability or Bayesian methods.*
- *The graduate analyzes recursive elements of algorithms, using applicable induction principles.*
- *The graduate analyzes the use of number theory in cryptography.*
- *The graduate determines computational models using deterministic and nondeterministic finite-state machines.*
- *The graduate solves problems using counting principles.*

Composition: Successful Self-Expression

Welcome to Composition: Successful Self-Expression! In this course, you will focus on four main topics: professional writing for a cross-cultural audience, narrowing research topics and questions, researching for content to support a topic, and referencing research sources. Each section includes learning opportunities through readings, videos, audio, and other relevant resources. Assessment activities with feedback also provide opportunities to check your learning, practice, and show how well you understand course content. Because the course is self-paced, you may move through the material as quickly or as slowly as you need to gain proficiency in the seven competencies that will be covered in the final assessment. If you have no prior knowledge or experience, you can expect to spend 30-40 hours on the course content. You will demonstrate competency through a performance assessment. There is no prerequisite for this course and there is no specific technical knowledge needed.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner composes a written message with language appropriate for cross-cultural communication.*
- *The learner incorporates research to support a position or idea.*
- *The learner incorporates self-expression in written communication.*
- *The learner researches valid and reliable sources.*

- *The learner writes a message using an effective communication approach for a given situation.*
- *The learner writes a reference list.*
- *The learner writes in a professional manner for a given scenario.*

American Politics and the US Constitution

American Politics and the U.S. Constitution examines the evolution of representative government in the United States and the changing interpretations of the civil rights and civil liberties protected by the Constitution. This course will give candidates an understanding of the powers of the branches of the federal government, the continual tensions inherent in a federal system, the shifting relationship between state and federal governments, and the interactions between elected officials and the ever-changing electorate. This course will focus on such topics as the role of a free press in a democracy, the impact of changing demographics on American politics, and the debates over and expansion of civil rights. Upon completion of the course, candidates should be able to explain the basic functions of the federal government, describe the forces that shape American policy and politics, and be better prepared to participate in America's civic institutions. This course has no prerequisite.

This course covers the following competencies:
- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate describes the influence of competing political ideologies on the development of the United States government.*
- *The graduate examines the influence of political parties, citizens, and non-governmental organizations on elections and other political processes inside a participatory democracy.*
- *The graduate examines the influence of the media, public opinion, and political discourse on American democracy.*
- *The graduate examines the struggle to balance individual liberty, public order, and state's rights.*
- *The graduate explains how the structure and powers of the United States government interact to form public policy.*

Ethics in Technology

Ethics in Technology examines the ethical considerations of technology use in the 21st century and introduces students to a decision-making process informed by ethical frameworks. Students will study specific cases related to important topics such as surveillance, social media, hacking, data manipulation, plagiarism and piracy, artificial intelligence, responsible innovation, and the digital divide. This course has no prerequisites.

This course covers the following competencies:
- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner describes ethical issues regarding data privacy, accuracy, access, and security.*
- *The learner explains professional ethical codes and their role in guiding professional behavior.*
- *The learner identifies interventions for personal bias and related legal concerns.*
- *The learner implements ethical decision-making frameworks in the information age.*

Health, Fitness, and Wellness

Health, Fitness, and Wellness focuses on the importance and foundations of good health and physical fitness—particularly for children and adolescents—addressing health, nutrition, fitness, and substance use and abuse.

This course covers the following competencies:
- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate identifies factors that influence mental, emotional, and social wellness.*
- *The graduate identifies the application of the core competencies of social and emotional learning.*
- *The graduate identifies the influence of disease, fitness, and lifestyle on the body.*
- *The graduate identifies the principles of nutrition and the components of a healthy diet.*

Data Management

Data Management - Foundations

Data Management Foundations offers an introduction in creating conceptual, logical and physical data models. Students gain

skills in creating databases and tables in SQL-enabled database management systems, as well as skills in normalizing databases. No prerequisites are required for this course

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner defines primary and foreign keys in data normalization.*
- *The learner determines how to run queries for creation and manipulation of data in relational databases.*
- *The learner explains attributes of databases, database tables, and structured and associated query language (SQL) commands.*

Data Management - Applications

Data Management - Applications covers conceptual data modeling and introduces MySQL. Students will learn how to create simple to complex SELECT queries, including subqueries and joins, and how to use SQL to update and delete data. Topics covered in this course include exposure to MySQL; creating and modifying databases, tables, views, foreign keys and primary keys (FKs and PKs), and indexes; populating tables; and developing simple Select-From-Where (SFW) queries to complex 3+ table join queries. The following course is a prerequisite: Data Management - Foundations.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner creates DML statements that insert, update, and delete data in data tables.*
- *The learner implements joins and aggregate functions in SQL queries.*
- *The learner queries database tables and views with SQL code.*
- *The learner recommends databases and database management systems to meet organizational needs.*

Network and Security

Network and Security - Foundations

Network and Security - Foundations introduces learners to the basic network systems and concepts related to networking technologies. Learners will gain skills in applying network security concepts for business continuity, data access, and confidentiality, and in identifying solutions for compliance with security guidance.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner applies network security concepts for business continuity, data access, and confidentiality.*
- *The learner identifies basic network systems and concepts related to networking technologies.*
- *The learner identifies solutions for compliance with security guidance.*

Web Development

Web Development Foundations

Web Development Foundations introduces students to web design and development using HTML, XML, and Cascading Style Sheets (CSS), the foundational languages of the web. This course also covers how to troubleshoot problems using developer tools and integrated development environments commonly employed in web development. There are no prerequisites for this course.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner creates the structure of basic web documents using HTML and XML.*
- *The learner implements web page formatting and interface aesthetics using CSS*
- *The learner resolves software problems in web development environments with debugging tools.*

Full Stack Engineering

Version Control

Version control is critical to maintaining software and enabling scalability solutions. A best practice for any programming project that requires multiple files uses version control. Version control enables teams to have collaborative workflows and enhances the software development lifecycle. This course introduces students to the basics of publishing, retrieving, branching, and cloning. There are no prerequisites for this course.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner implements version control processes and solutions that maintains source code.*

Software

Scripting and Programming - Applications

Scripting and Programming - Applications for undergraduates explores the various aspects of the C++ programming language by examining its syntax, the development environment, and tools and techniques to solve some real-world problems.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The graduate applies fundamental programming concepts in a specific programming environment.*
- *The graduate applies object-oriented programming concepts in order to create a basic application.*
- *The graduate applies pointers to solve complex problems.*
- *The graduate creates arrays in order to solve complex problems.*
- *The graduate prepares code which declares, initializes, and assigns values to variables of appropriate types as part of the application development process.*
- *The graduate writes code that creates and manipulates functions and files.*
- *The graduate writes code that implements decision and loop constructs to control the flow of a program.*

Java Fundamentals

Java Fundamentals introduces you to object-oriented programming in the Java language. You will create and call methods, design Java classes, and other object-oriented principles and constructs to develop software that meets business requirements. This course requires foundational knowledge of programming including variables, type, program flow and debugging.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner creates methods in Java.*
- *The learner creates object-oriented programs.*

Java Frameworks

Java Frameworks builds object-oriented programming expertise and introduces powerful new tools for Java application development. Students will execute exception handling, Java frameworks, and other object-oriented principles and constructs to develop a complete application including a user interface. This course requires foundational knowledge of object-oriented programming and the Java language.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner implements object-oriented programming frameworks.*
- *The learner implements user interfaces.*

Back-End Programming

Back-End Programming introduces students to creating back-end components of a web application with the support of framework packages. This course also teaches students how to implement database functionality in a web application and how to create web services. This course requires intermediate expertise in object-oriented programming and the Java language.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner develops object-oriented applications that can be integrated with relational databases.*

- *The learner implements design patterns for object-oriented applications.*
- *The learner writes code for object-oriented applications using Spring framework.*

Advanced Java

Advanced Java refines object-oriented programming expertise and skills. You will implement multithreaded, object-oriented code with the features of Java necessary to develop software that meets business requirements. Additionally, you will determine how to deploy software applications using cloud services. This course requires intermediate expertise in object-oriented programming and the Java language.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner determines how to deploy software applications using cloud services.*
- *The learner writes multithreaded, object-oriented code using Java frameworks.*

Software Design and Quality Assurance

Software Design and Quality Assurance applies a QA focus to every phase of the software development life cycle. This course investigates best practices for quality analysis, quality planning, and testing strategies as they pertain to the everyday practice of software development. Students will come to understand how their work fits into the bigger picture: how QA, testing, and code-writing practices interact within specific process models; the potential impact of new code on existing code or on other applications; the importance of usability and the influence users have on the ultimate success of an application. Students will explore test plans, test cases, unit tests, integration tests, regression tests, usability tests, and test and review tools.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner defines plans for development tasks and environments based on desired quality outcomes.*
- *The learner determines the impact of business requirements on software design patterns and software systems.*
- *The learner identifies goals and potential roadblocks as part of software development plans.*
- *The learner recommends tools and services to address functional and non-functional testing outcomes.*

Operating Systems

Linux Foundations

Linux Foundations prepares learners for the LPI Linux Essentials certification, and is an introduction to Linux as an operating system as well as an introduction to open-source concepts and the basics of the Linux command line. Learners will gain skills in identifying the fundamentals of open-source software and to develop resources for data access and security.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner develops resources for data access and security.*
- *The learner identifies the fundamentals of open-source software.*

Secure Systems Analysis & Design

Fundamentals of Information Security

This course lays the foundation for understanding terminology, principles, processes, and best practices of information security at local and global levels. It further provides an overview of basic security vulnerabilities and countermeasures for protecting information assets through planning and administrative controls within an organization. This course has no prerequisites.

This course covers the following competencies:

- *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*
- *The learner identifies cybersecurity guidelines in privacy and compliance.*
- *The learner identifies security principles, policies, practices, and methods for asset protection and cyber defense.*

● *The learner identifies security requirements based on principles of confidentiality, integrity, and availability.*

Information Technology Management

Operating Systems for Computer Scientists

Operating Systems for Computer Scientists focuses on the intricacies of operating systems. This comprehensive course for computer science students covers core principles such as processes, threads, memory management, and file systems, providing students with insights into CPU scheduling algorithms, deadlock handling, and system performance optimization. Additionally, the course delves into security mechanisms, addressing common threats and preventative measures. Through a blend of theoretical concepts and practical applications, students emerge equipped to adeptly navigate operating system features and prepared for real-world challenges in computer science.

This course covers the following competencies:

● *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*

● *The learner describes different file systems and I/O algorithms.*

● *The learner describes mechanisms used by the operating system for protection and security and how they relate to software applications.*

● *The learner describes operating systems, their functions, and their structure.*

● *The learner describes processes and threads and their relationship to multithreading and parallel programming.*

● *The learner explains the different approaches to memory management and how they affect CPU utilization.*

Software Engineering

Software Engineering introduces the concepts of software engineering to students who have completed the core courses in programming and project management. The principles build on previously acquired concepts, switching the emphasis from programming simple routines to engineering robust and scalable software solutions. This course does not cover programming, but it provides an overview of software engineering processes and their challenging nature, focusing on the need for a disciplined approach to software engineering. A generic process framework provides the groundwork for formal process models. Prescriptive process models such as the Waterfall Model and Agile Development are included. This course also introduces the elements and phases of software engineering, including requirements engineering, design concepts, and software quality. There are no prerequisites for this course.

This course covers the following competencies:

● *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*

● *The learner analyzes the objectives, scope, and organizational impact of software systems.*

● *The learner creates test cases for quality assurance as part of software development processes.*

● *The learner determines optimal software design for given requirements.*

● *The learner identifies the costs and impact of design changes to software systems.*

Business of IT

Business of IT - Applications

Business of IT - Applications examines Information Technology Infrastructure Library (ITIL®) terminology, structure, policies, and concepts. Focusing on the management of information technology (IT) infrastructure, development, and operations, learners will explore the core principles of ITIL practices for service management to prepare them for careers as IT professionals, business managers, and business process owners. This course has no prerequisites.

This course covers the following competencies:

● *Begin your course by discussing your course planning tool report with your instructor and creating your personalized course plan together.*

● *The learner applies Information Technology Infrastructure Library (ITIL) concepts, core components, principles, and models of service management.*

● *The learner applies the Information Technology Infrastructure Library (ITIL) six activities of the service value chain.*

Accessibility and Accommodations

Western Governors University (WGU) is committed to providing equal access to its academic programs to all qualified students. WGU's Student Disability Services department supports this mission by providing support, resources, advocacy, collaboration, and academic accommodations in accordance with federal and state statutes and regulations to WGU students and prospective students. Potential and current students needing to request accommodation(s) are encouraged to contact Student Disability Services to initiate the request. To initiate the accommodation process, all potential and current WGU students must complete the secure online Accommodation Request Form located at' *https://www.wgu.edu/wgu/ada_form*. Potential and current students can reach the Student Disability Services team Monday through Friday 8:00 a.m. to 5:00 p.m. MT at 1-877- 435-7948 x5922 or at *sds@wgu.edu*.

Need More Information? WGU Student Services

Student Support Services team members also assist with unresolved concerns to find equitable resolutions. To contact the Student Support Services team, please feel free to call 877-435-7948 or e-mail *studentservices@wgu.edu*. We are available Monday through Friday from 6:00 a.m. to 10:00 p.m., and Saturday and Sunday, 10:00 a.m. to 7:00 p.m, mountain standard time.