



**School of Computer Science and Information Systems**  
**44-525 (01-02) Theory & Implementation of Programming Languages (3 hours)**  
**Fall 2025**

**Instructor:** Dr. Aziz Fellah

**Email:** [afellah@nwmissouri.edu](mailto:afellah@nwmissouri.edu)

**Lecture times:** MWF: 11:00-11:50 AM (Sect. 01, GS 1050) & MWF: 10:00 AM-10:50 AM (Sect. 02, GS 1050)

**Office hours:** MW: 2:00 PM – 4:30 PM & F: 2:00 PM – 4:00 PM or by appointment

**Office:** Colden Hall 2220 Tel: (660) 562-0803

**Graduate Assistant:** Bhavani Kongari - S575201@nwmissouri.edu

**Prerequisites:** CSIS 44242, and CSIS 44249/Math 17215 with grade of C or better, or consent of instructor.

**Textbook and supplementary materials:** Selected instructional materials and resources that meet the needs of students, including the textbook "Concepts of Programming Languages", Robert W. Sebesta, 2016, 11<sup>th</sup> Edition, Pearson. All course material will be posted on Canvas.

**Software:** C/C++/Java/Python, Jflap, other related software and compilers will be introduced at appropriate time.

**Course description:**

Syntax and semantics of programming languages; the translation process; and features of procedural, applicative, and object-oriented languages.

**Use of AI in the Course:**

AI tools, including ChatGPT, may be used as a supplement for understanding programming language theory and implementation. Usage must be documented, and students are expected to critically evaluate AI output. AI is supportive, not substitutive.

Student learning outcomes	Assessment methods
1. Be able to understand basic principles and concepts of programming languages design – specification of syntax and semantics.	Assignments, In-Class practice, exams, Quizzes
2. Be able to master syntax-related concepts, including finite state and push-down automata, context-free grammars, top-down and bottom-up parsing (e.g., recursive descent parsing, shift reduce).	Assignments, In-Class practice, exams, Quizzes
3. Be familiar with semantic related to function implementations, including regular expressions, variable binding, scoping rules, parameter passing, dynamic memory allocation, recursion, and exception handling.	Assignments, In-Class practice, exams, Quizzes
4. Be familiar with implementation of object-oriented languages.	Assignments, In-Class practice, exams, Quizzes
5. Be familiar with using functional languages.	Assignments, In-Class practice, exams, Quizzes
6. Be able to use install and use software such as Jflap.	Assignments, In-Class practice, exams, Quizzes
7. Be able to compare various programming paradigms such as imperative, functional, logic, and object-oriented programming.	Assignments, In-Class practice, exams, Quizzes, Project

8. Be able to identify and use appropriate technical literature through activities including reading papers, presentations, and successfully completing a team project in programming language.	Project
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------

**Instructional methods:**

- Lectures, practical demonstrations, in-class practice, and non-programming and programming assignments.
- Students are expected to spend at least 2 hours outside of class for each hour in class reading related sections posted on Canvas.

**Graded course requirements:**

Category	%	Dates are subject to change
Exams (2 exams)	13%, 13%	Exam#1: Friday, Oct-10-2025 at class time Exam#2: Monday, Nov-17-2025 at class time
Final Exam	15%	Final Exam: Class 10:00 AM (Section 02) – Exam at 10:10 AM - 12:10 PM on 12-08-2025 Class 11:00 AM (Section 01) – Exam at 10:10 AM - 12:10 PM on 12-10-2025
Assignments	25%	Refer to assignments and late submission policy
In-class Practices & Participation	4%	Grade assigned at the discretion of the instructor
Project	10%	To be announced as we proceed in the course
4 announced quizzes + bonus quiz	15%	Refer to Exam/quizzes dates & policy.
Attendance	5%	
Total Points	100%	

The final exam schedule is published on-line at: <http://www.nwmissouri.edu/registrar/finals.htm>

All exams are closed book, closed notes, unless explicitly noted in writing by the instructor, no calculators, cell phones, or other electronic devices can be used during exams or quizzes unless explicitly allowed by the instructor.

**Grading scale:**

Percent Range	Grade
90-100%	A
>= 80% and < 90%	B
>= 70% and < 80%	C
>= 60% and < 70%	D
below 60%	F

The primary factor in determining your grade is the quality of your work. Other factors will, however, negatively influence your grade, for example including but not limited to:

- Failure to submit required work and artifacts on time, unless granted an extension.
- Unexcused and excessive absences.

**Course outline/major topics studied:**

Week	Tentative and expected topics (subject to change)	Lecture notes, resources, readings
Week 1,2	Introduction to programming languages and reasons for studying concepts of programming languages. Evolution of the major programming languages.	Chap. 1, 2
Week 3, 4	Syntax and semantics, alphabets, languages, regular expressions, finite state automata, determinism and non-determinism, compilers, and interpreters.	Chap. 3
Week 4, 5, 6	Lexical and Syntax Analysis: Forms of syntax specification: CFG, BNF, EBNF, other notations; derivations; parse trees, pushdown automata, parsing, recursive-descent parsing and bottom-up parsing, syntax, and semantic errors.	Chap. 3, 4
Week 7	Names, binding, and scopes. Naming; bindings; scope (static, dynamic	Chap. 5
Week 8,9	Data types: primitive data types, character string types, enumerated array types, record types, list types of pointer and reference types. Type systems, (i.e., static vs. dynamic, strong vs. weak); type checking, type equivalences	
Week 10	Control flows, subprograms, implementing subroutines, runtime stack and activation records, memory allocation (static, stack, and heap).	Chap. 9, 10
Week 11	Object-oriented programming, abstract Data types, encapsulation, information hiding, expectation handling.	Chap. 11
Week 11,12,13	Functional programming languages	Chap. 15
Week 13,14	Logic programming languages	Chap. 16
Week 15	Current trends in programming languages	

**Disclaimer:** Course schedule is subject to change. You will be responsible for abiding by any such changes. Your instructor will notify you of any changes.

**Academic Calendar:** <http://www.nwmissouri.edu/academics/calendar.htm>

**Attendance:** Attendance is very important in successfully completing this course as students will have many in-class activities. It is important for you to attend classes. Information given during class meetings is vital to earning a good grade. You are responsible for all material presented in whether you are present or not. It is the responsibility of the student to promptly notify the instructor when unable to attend. Students are expected to be on time for each class period. It is the responsibility of the student to promptly notify the instructor when unable to attend class. Please refer to the university policy on attendance at <https://www.nwmissouri.edu/policies/academics/Attendance.pdf>

**Final exams:** If an emergency occurs that prevents the administration of a course scheduled final examination, the final course grades will be calculated based on the work in the course completed to that point in time and the faculty member's considered judgment. Final exams will not be rescheduled, and a grade of "I" will not be given because of an institutional cancellation of a final examination. <https://www.nwmissouri.edu/policies/academics/Adding-Dropping-Withdrawals.pdf>

**Administrative drop:** An instructor may request the Office of the Registrar delete a student from a course roster if the student has not met the prerequisite for the course as stated in the catalog, or because of non-attendance in the course, or/and as a result not returning/doing the coursework.

**Academic Administrative Withdrawal:** When it is in the best interest of Northwest Missouri State University for a student to withdraw, a student will be given a W, put on administrative hold, and given notice that they are about to be withdrawn. This action will result in removal of all credits associated with courses that have yet to be completed in the semester in question and the student will be administratively withdrawn from the

University. An Administrative Withdrawal does not affect the student's grade point average. Please refer to Northwest Missouri State University's Academic Administrative Withdrawal Policy.

**University communications:** Students are expected to use their Northwest student email account for any electronic correspondence within the university. Students are also strongly advised to check their email and CatPAWS accounts on a regular basis.

**Announcements, postings, and email:** Course material and announcements are communicated via the course website and your Northwest Missouri State University (Northwest) email account. It is your responsibility to check each of these sources daily. All announcements shall be announced in class as well. All courses related emails to the instructor and/or assistants must include the course name, number, and meeting time in the subject line. For security and quick response, emails that do not include an appropriate entry for the subject may not be opened and or ignored.

**Academic integrity policy:** The students, faculty, and staff at Northwest endeavor to sustain an environment that values honesty in academic work, that acknowledges the authorized aid provided by and intellectual contributions of others, and that enables equitable student evaluation. Please refer to Northwest Missouri State University's Academic Integrity Policy at <http://www.nwmissouri.edu/policies/academics/Academic-Integrity.pdf>

**Assignments and late submission policy:** Assignments will be posted at appropriate times during the semester. Assignment's submission instructions and guidelines will be stated in each homework. Assignments are designed to illustrate concepts covered in class. Cooperating with other students, on academic course work, only where specifically authorized. Also, note that all assignments are to be done individually unless specified otherwise. In addition, you should represent your own work honestly and accurately. You may discuss with your classmates about an individual assignment, but you must do your own work in completing the assignment. Each assigned and graded activity will have a due date posted and is expected to be completed by the due date. Failure to follow these guidelines will be subject to the penalties described in the academic integrity/honesty paragraph. Late assignments will be accepted, but there is a 10% penalty per calendar day (submission up to 24 hours after the due date will be considered as a late submission). If no submission after 24 hours after the due date, then the student will receive a grade of zero. For late work, exceptions can always be made for medical and compassionate reasons arranged in advance with the instructor. No late submissions will be accepted during finals week. The course concludes at the end of our final time.

**Exam dates & policies:** Dates for all exams are on the syllabus, but they are subject to change. In case you miss an exam for a valid reason (e.g., being sick, family emergencies, university-sponsored trips), it is your responsibility to notify the instructor prior to the exam. However, I reserve the right to ask for a proof. Quizzes will be given at appropriate times and the exact dates will be announced in class and/or on Canvas. There will be no make-up for quizzes. However, at the end of the term, students will be given a chance to take one and only one make-up quiz for one quiz they missed.

However, If you did not miss any quiz and you would like to improve your grade then you are also illegible to take a make-up quiz to substitute for your lowest quiz grade.

**Digital devices & PC in classroom:** There will be no aids during exams, including calculators, pagers, text messages, and cellphones, etc. Make sure your cellphone does during exams and lectures. Distractive activities such read/write e-mails, chatting, and playing games during lectures are not allowed. This is very disruptive to me and the other students in the class, including your self-distraction from learning the material. Students are supposed to use such a technology, if needed, to improve and enhance their education but not to replace the instructor.

**Grade appeals:** You can contact your GA/TA for any questions or remarks about your work, which will be accepted up to one week after the marks have been released. However, students may discuss/view their graded work (exams, quizzes, assignment, etc.) during my office hours and within one week period. Any academic issue that has not been resolved by your GA/TA should be forwarded to me, either verbally or by e-mail.

**Learning or Living Accommodations Request Process:** Northwest Missouri State University complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 [ADA] and the ADA Amendments Act of 2008 [ADAAA]. If a student has a documented disability that qualifies under the ADA/ADAAA and requests accommodations, they should review the Accessibility and Accommodations webpage at <https://www.nwmissouri.edu/titleixequity/accessibility/index.htm> for guidance, including the accommodations application and supporting documentation requirements. Contact [ada@nwmissouri.edu](mailto:ada@nwmissouri.edu) or 660.562.1873 for further assistance. For the university policy on disability accommodation refer to <http://www.nwmissouri.edu/policies/student/Disability-Accommodation.pdf>

**Non-discrimination and anti-harassment policy:** Northwest Missouri State University is committed to maintaining an environment for all faculty, staff, students, and third parties that is free of illegal discrimination and harassment. Please refer to the Non-Discrimination and Anti-Harassment Policy at <https://www.nwmissouri.edu/TitleIXEquity/titleix/>

**Family Education Rights and Privacy Act (FERPA) policy:** Family Educational Rights and Privacy Act of 1974, as amended (commonly known as the Buckley Amendment), is a federal law which provides that colleges and universities will maintain the confidentiality of student education records. Please refer to the Family Educational Rights and Privacy Act (FERPA) Policy at <http://www.nwmissouri.edu/policies/academics/Family-Educational-Rights-and-Privacy-Act.pdf>

**Behavior and Wellness:** Northwest focuses on student success—every student, every day. The Wellness Center, 660.562.1348, offers free counseling for students coping with depression, anxiety, alcohol or drug misuse, relationships, and other emotional, social, and academic stressors. In addition, faculty, staff, and students who are concerned with student wellbeing can report their concerns, including anonymously, to the Behavioral Intervention Team, so that the student can be offered relevant support, at this link: [Concerning Behavior Reporting Form](#). If you are concerned about the immediate safety of a student, please call the University Police, who have specialized training in intervention, at 660.562.1254.

**A note on Artificial Intelligence (AI) Engines:** Generative AI engines, such as GPT and others, are becoming important tools to help improve various professional experience and can help facilitate the learning process. However, any work written, developed, created, inspired, or co-authored by artificial intelligence (AI) is not allowed. This is because the use of AI deflects and divert your attention away from contributing your ideas in free and authentic ways and learning from your experiences and from each other.

**Course Evaluation:** At the end of this course, you will be encouraged to complete a course evaluation.

**Syllabus Revisions:** This syllabus is not a contract and is subject to changes to accommodate instructional and/or student needs. It is the sole responsibility of the student to maintain an updated course syllabus. However, students will be notified of any changes.