

1. Course number and name

CptS 321: Object-Oriented Software Principles

2. Credits and contact hours

3 credits, 3 lecture hours

3. Instructor's or course coordinator's name

Venera Arnaoudova

4. Textbook, title, author, and year

J. Albahari and B. Albahari. *C# 7.0 in a Nutshell: The Definitive Reference*, O'Reilly Media, 2017. ISBN-13: 978-1491987650. (Optional)

5. Specific course information

- a. *Catalog description*: Object-oriented programming for flexibility, efficiency, and maintainability; logic and UI decoupling; complexity analysis, data structures, and algorithms for industry-quality software.
- b. *Prerequisites or corequisites*: Cpt S 223 with a C or better or Cpt S 233 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, or Software Engineering.

6. Specific goals for the course

By the end of the course, students will be able to

- Describe and apply the fundamental concepts of the C# programming language including the typing system, inheritance and polymorphism rules, and reflection (1a, 1c, 1e, 2a, 2b, 2c, 2d, 2e, 2g).
- Describe how the event-driven model works for desktop applications and apply this knowledge to build software with graphical user interfaces (1a, 1c, 1e, 2a, 2b, 2c, 2d, 2e, 2g).
- Describe and implement object-oriented design patterns and strategies that allow for updates to code that do not disrupt any other existing application components (1a, 1c, 1e, 2a, 2b, 2c, 2d, 2e, 2g).
- Explain and implement expression tree data structures for evaluating arithmetic expressions (1a, 1c, 1e, 2a, 2b, 2c, 2d, 2e, 2g).
- Build applications piece-by-piece, building on previous foundations without making the code difficult to manage (1a, 1c, 1e, 2a, 2b, 2c, 2d, 2e, 2g).

7. Brief list of topics to be covered

- Decoupling of software components.
- Data structures for modern software features.
- Design principles.
- Introduction to Graphical User Interface (GUI) design.
- Event-driven applications.
- C# language features, streams.
- Arithmetic expression trees.

- Spreadsheet application (formula evaluation, loading/saving).
- Design choices in .NET framework objects.
- Undo/redo system design.
- C# extension methods.
- XML.
- Threading.
- WinForms custom controls.