

**SU DEPARTMENT OF COMPUTER SCIENCE SYLLABUS**  
**COSC401/501 *Methods of Teaching Computer Science***

**Description:** This course introduces methods of teaching computer science at the K-12 level using an activity-based approach. Topics include history, social impacts, and contemporary fields of computer science; Fundamental computer science concepts; Problem solving strategies; K-12 computer science curriculum and classroom activity development. Students will develop and explore materials appropriate for use in the K-12 setting. Three hours per week and one hour enhancement.

**Prerequisites:** Permission of instructor.

**Required textbooks:**

“*Guide to Teaching Computer Science – An Activity-Based Approach*”, by Hazzan, Lapidot, and Ragonis, Springer, London 2015, ISBN 978-1-4471-6904-8 (soft cover), ISBN 978-1-4471-6630-6 (eBook).

“*Computational Thinking {and Coding} for Every Student: The Teacher’s Getting-Started Guide*” by Jane Krauss, and Kiki Prottzman, Corwin, California 2016, ISBN 9781506341286.

“*Introduction to Programming Using Java*” by David Eck [pdf](#) or [ebook](#) or [web](#).

**Reference:**

“*Computer Science Education – Perspective on Teaching and Learning in School*”, edited by Sentance, Barendsen, and Schulte, Bloomsbury Academic, London 2018, ISBN 978-1-3500-5711-1, ISBN 978-1-3500-5713-5 (ePDF).

|   | <b>Weeks</b> |
|---|--------------|
| <b>Unit # 1 Overview</b><br>Discussion on history, social issues, modern fields of CS; Introduction to active-learning-based teaching methods and the CSTA K-12 standards and the K-12 Computer Science framework.  | 1.0          |
| <b>Unit # 2 Computational thinking and problem solving strategies</b><br>Exploration of computational thinking and problem solving processes such as decomposition, abstraction, pattern matching, stepwise refinement, and automation.   | 2.0          |
| <b>Unit # 3 Teaching methods for fundamental CS concepts</b><br>Introduction to CS-unplugged approach and pedagogical tools: concept maps, metaphors, classifications; fundamental CS concepts such as von Neumann computer architecture, variables, control structures such conditional and looping statements.  | 2.0          |
| <b>Unit # 4 Strategies for formative and summative assessment</b><br>Exploration of formative and summative assessment techniques, question types, designing exams and grading rubrics; Introduction to array.  | 2.0          |
| <b>Unit # 5 Learners’ alternative concepts, CS education research and more CS concepts</b><br>Discussion on learners’ alternative conceptions and reflection as a teaching and learning tool, computer science education research; Introduction to objects, classes and methods in object-oriented programming, testing and debugging during program development. | 2.0          |
| <b>Unit # 6 Programming tools and teaching and learning resources</b><br>Exploration of different integrated programming environments (IDEs) for Java, teaching and self-learning resources and professional organizations.   | 1.0          |
| <b>Unit # 7 Capstone projects on lesson development</b><br>Introduction to team project management using Scrum; Working on a team project to develop a lesson plan for a selected topic, teach it to peers and provide feedback to peer teaching.   | 2.0          |
| <b>Unit # 8 Advanced CS topics (optional)</b><br>Introduction to algorithm analysis, object-oriented design and development and AP Computer Science exams.  | 1.0          |
| <b>Test</b><br>Take regular final exam or pass Praxis II computer science test.   | 1.0          |
| <b>Total</b>  | <b>14.0</b>  |

## EVALUATION

- Homework (4 and 2 *extra for graduate students*) - 15%
- Programming projects (3 and 2 *extra for graduate students*) - 25%
- Writing and presentation projects (3 and 2 *extra research-based projects for graduate students*) - 20%
- Midterm exams (*extra one challenging questions for graduate students*) - 20%
- Final Exam (*extra two challenging questions for graduate students*) - 20%

**Policy for determining letter grade for the course is below:**

| Letter grade | Undergraduate students<br>final grade | Graduate students<br>final grade |
|--------------|---------------------------------------|----------------------------------|
| A            | 90% above                             | 92% above                        |
| B            | $\geq 80\%$ and $< 90\%$              | $\geq 85\%$ and $< 92\%$         |
| C            | $\geq 70\%$ and $< 80\%$              | $\geq 75\%$ and $< 85\%$         |
| D            | $\geq 60\%$ and $< 70\%$              | $\geq 65\%$ and $< 75\%$         |
| F            | $< 60\%$                              | $< 65\%$                         |

Exercises and Activities: This course contains list of programming exercises and discussion activities to practice the programming concepts and explore pedagogy to teach programming concepts. The programming exercises will be in the lab and out of classroom and discussion activities will be in the classroom.

### Writing Across the Curriculum:

The Math and Computer Science Department supports the SU position that graduates will be able to communicate clearly and correctly in all written work. This course is in full support of the emphasis to give the students every opportunity to reinforce their skills in expository writing. For that reason, all student written work including reflection journals, analysis papers, course syllabus and lecture material developed, and reports in this course are subject to the following guidelines: correct spelling, punctuation, grammar, content and organization.

### Additional information:

- The course does not satisfy a general education requirement.
- Should inclement weather result in classes being canceled information will be given to all local radio and television stations. Students can receive information concerning cancellations by listening to local stations or by calling the Gull Line at (410) 546-6426. The institutional policy with regard to closing is that unless there are the most dire circumstances the institution will remain open for business. Students must exercise their best judgment about whether they attend class. Different conditions prevail for each individual under inclement weather situations so the decision should be essentially an independent one. If you do not hear an announcement about cancellation of classes, then classes and events will be held as scheduled. Please do not call the University Police Office about cancellation notices so that office can assist with emergency needs.
- Students are not to be penalized because of observances of their religious holidays and are to be given opportunity, wherever feasible, to make up within a reasonable time any academic assignments missed due to participation in religious observances.  
(<https://www.usmd.edu/regents/bylaws/SectionIII/III510.html>)  
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