CSE 307 – Principles of Programming Languages
Course Information

Spring 2017
Stony Brook University
Instructor: Dr. Paul Fodor
http://www.cs.stonybrook.edu/~cse307
Course Description

• “Presents examples of important programming languages and paradigms such as LISP, ALGOL, ADA, ML, Prolog, and C++. Students write sample programs in some of the languages studied. The languages are used to illustrate programming language constructs such as binding, binding times, data types and implementation, operations (assignment data-type creation, pattern matching), data control, storage management, parameter passing, and operating environment. The suitability of these various languages for particular programming tasks is also covered.”

• Prerequisites: CSE 219 or CSE 260, and CSE 220 and the CSE major or permission of instructor.
Official Course Outcomes

• The following are the official course goals agreed upon by the faculty for this course:
  • Knowledge of, and ability to use, language features used in current programming languages.
  • An ability to program in different language paradigms and evaluate their relative benefits.
  • An understanding of the key concepts in the implementation of common features of programming languages.
Topics

• **Major Topics Covered in Course:**
  • Principles of Language Design
  • Specification of Language Syntax
  • Survey of Procedural and OO Languages
  • Intro. to Functional Programming
  • Intro. to Logic Programming
  • Programming Language Semantics
  • Values; Bindings; Types;
  • Programming Language Constructs
  • Expressions; Statements
  • Procedures and Environments
  • Parameter Passing
Instructor Information

• Dr. Paul Fodor
  214 New Computer Science Building

• Office hours: Mondays and Wednesdays 5:30PM-7:00PM.

• Email: paul (dot) fodor (at) stonybrook (dot) edu
  • Please include “CSE 307” in the email subject and your name in your email correspondence
General Information

• Meeting Information:
  • Lectures: TuTh 5:30PM - 6:50PM, Humanities 1003.

• Course Web page:
  http://www.cs.stonybrook.edu/~cse307

• Blackboard will be used for assignments, grades and course material
Sometimes I might be a little late and have to leave on time because of my schedule on Tuesdays and Thursdays:

- **TuTh 4:00PM - 5:20PM**, CSE/ISE 312 - Legal, Social, and Ethical Issues in Information Systems, Javits 111.
- **TuTh 5:30PM - 6:50PM**, CSE307 Principles of Programming Languages, Humanities 1003.
- **TuTh 7:00PM - 8:20PM**, CSE 114 Computer Science I, Frey Hall 100.
Textbook


Part I

- 1 Intro
- 2 Syntax
- 3 Names
- 4 Semantics
- 5 Architecture
- 6 Control

Part II

- 7 Type Systems
- 8 Composite Types
- 9 Subroutines
- 10 Objects

Part III

- 11 Functional
- 12 Logic
- 13 Concurrency
- 14 Scripting

Part IV

- 15 CodeGen
- 16 Runtime
- 17 Improvement

F: The full-year/self-study plan
R: The one-semester Rochester plan
P: The traditional Programming Languages plan;
   would also de-emphasize implementation material
   throughout the chapters shown
C: The compiler plan; would also de-emphasize design material
   throughout the chapters shown

Green boxes indicate supplemental (CD) section
Red boxes indicate sections to be skimmed by students
in need of review.
https://en.wikipedia.org/wiki/Measuring_programming_language_popularity
<table>
<thead>
<tr>
<th>Websites</th>
<th>Popularity (unique visitors)</th>
<th>Front-end (Client-side)</th>
<th>Back-end (Server-side)</th>
<th>Database</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google.com</td>
<td>1,100,000,000</td>
<td>JavaScript</td>
<td>C, C++, Go, Java, Python, Dart</td>
<td>BigTable, MariaDB</td>
<td>The most used search engine in the world</td>
</tr>
<tr>
<td>YouTube.com</td>
<td>1,000,000,000</td>
<td>JavaScript</td>
<td>C/C++, Python, Java, Go, PHP</td>
<td>MySQL, BigTable, MariaDB</td>
<td>The most visited video sharing site</td>
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<td>Facebook.com</td>
<td>900,000,000</td>
<td>JavaScript</td>
<td>Hack, PHP, C++, Java, Python, Erlang, D</td>
<td>MySQL, HBase, Cassandra</td>
<td>The most visited social networking site</td>
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<tr>
<td>Yahoo</td>
<td>750,000,000</td>
<td>JavaScript</td>
<td>JavaScript, PHP</td>
<td>MySQL, PostgreSQL</td>
<td>Yahoo is presently transitioning to a new platform</td>
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<td>Amazon.com</td>
<td>500,000,000</td>
<td>JavaScript</td>
<td>Java, C++, Perl</td>
<td>Oracle Database</td>
<td>Popular internet shopping site</td>
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<td>Wikipedia.org</td>
<td>475,000,000</td>
<td>JavaScript</td>
<td>PHP, Hack</td>
<td>MySQL, MariaDB</td>
<td>&quot;MediaWiki&quot; is programmed in PHP, runs on MediaWiki</td>
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<tr>
<td>Twitter.com</td>
<td>290,000,000</td>
<td>JavaScript</td>
<td>C++, Java, Scala, Ruby on Rails</td>
<td>MySQL</td>
<td>140 characters social network</td>
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<tr>
<td>Bing</td>
<td>285,000,000</td>
<td>JavaScript</td>
<td>ASP.NET</td>
<td>Microsoft SQL Server</td>
<td></td>
</tr>
<tr>
<td>eBay.com</td>
<td>285,000,000</td>
<td>JavaScript</td>
<td>Java, JavaScript</td>
<td>Oracle Database</td>
<td>Online auction house</td>
</tr>
<tr>
<td>MSN.com</td>
<td>280,000,000</td>
<td>JavaScript</td>
<td>ASP.NET</td>
<td>Microsoft SQL Server</td>
<td>An email client, for simple use. Mostly known</td>
</tr>
<tr>
<td>Microsoft</td>
<td>270,000,000</td>
<td>JavaScript</td>
<td>Java, JavaScript, Scala</td>
<td>Voldemort</td>
<td>World’s largest professional network</td>
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<td>LinkedIn.com</td>
<td>260,000,000</td>
<td>JavaScript</td>
<td>Java, JavaScript, Scala</td>
<td>MySQL, Redis</td>
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<td>Pinterest</td>
<td>250,000,000</td>
<td>JavaScript</td>
<td>Django (a Python framework)</td>
<td>MySQL, Redis</td>
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<td>Ask.com</td>
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<td>JavaScript</td>
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<td>PHP</td>
<td>MySQL</td>
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https://en.wikipedia.org/wiki/Programming_languages_used_in_most_popular_websites

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Grading Schema

• Homework, projects, and quizzes -- 25%
• Midterm exams (2) -- 50% (25% each)
• Final exam -- 25%
Exam dates

• Midterm exam 1: Thursday 3/2, classtime, in classroom.
• Midterm exam 2: Thursday 4/13, classtime, in classroom.
• Final exam: Tue., 5/16, 11:15AM-1:15PM, in classroom. See Final Exams University Schedule here: http://www.stonybrook.edu/commcms/registrar/registration/exams.html
Assignments

- Homework assignments due on fixed dates and times.
  - no late submission is permitted
- All assignments should be submitted electronically
  - Blackboard and textbook Web site
Regrading of Homework/Exams

- Please meet with a TA or the instructor and arrange for regrading.
- You have one week from the day grades are posted or mailed or announced
- Late requests will not be entertained
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Programming Languages</td>
</tr>
<tr>
<td>2</td>
<td>Python</td>
</tr>
<tr>
<td>3</td>
<td>SML</td>
</tr>
<tr>
<td>4</td>
<td>Programming language syntax</td>
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<tr>
<td>5</td>
<td>Programming language syntax (cont.)</td>
</tr>
<tr>
<td>6</td>
<td>Review Session and Midterm Exam 1</td>
</tr>
<tr>
<td>7</td>
<td>Names, Scopes, and Bindings</td>
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<tr>
<td>8</td>
<td>Spring Recess</td>
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<tr>
<td>9</td>
<td>Semantic Analysis</td>
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<td>10</td>
<td>Control Flow, Data Types</td>
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<td>11</td>
<td>Subroutines and Control Abstraction</td>
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<tr>
<td>12</td>
<td>Review Session and Midterm Exam 2</td>
</tr>
<tr>
<td>13</td>
<td>Data Abstraction and Object Orientation, Functional Languages</td>
</tr>
<tr>
<td>14</td>
<td>Logic Languages</td>
</tr>
<tr>
<td>15</td>
<td>Logic Languages, Concurrency, Review Session</td>
</tr>
</tbody>
</table>
Disability Support Services

• If you have a physical, psychological, medical or learning disability, contact the DSS office at Room 128 ECC. Phone 632-6748/TDD

• If you are planning to take an exam at DSS office, you need to tell me ahead of time for every exam.

• All documentation of disability is confidential.
Academic Integrity

- You can discuss general assignment concepts with other students: explaining how to use systems or tools and helping others with high-level design issues
- You **MAY NOT share** assignments, source code or other answers by copying, retyping, looking at, or supplying a file
  - Assignments are subject to manual and automated similarity checking (We do check! and our tools for doing this are much better than cheaters think)
- If you cheat, you will be brought up on academic dishonesty charges - we follow the university policy:
  - [http://www.stonybrook.edu/uaa/academicjudiciary](http://www.stonybrook.edu/uaa/academicjudiciary)
Catastrophic events

- Major illness, death in family
- Formulate a plan (with your CEAS academic advisor) to get back on track
- Advice
  - Once you start running late, it’s really hard to catch up
Please

- Please be on time
- Please show respect for your classmates
- Please turn off (or use vibrate for) your cellphones

...

- On-topic questions are welcome
Welcome and Enjoy!