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|  | **Ai2 Lecture Series 1**  **Short Course on Programming in C/C++** |  |

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| **Subjects** | **Week** | **Tentative Hours** |
| **Overview of Programming Languages** | **1** | **1** |
| Functional and Imperative Languages |
| **Introduction to C, “Hello World”** | **1** |
| First Program in C, Printing “Hello World” |
| **Data Types and Expressions** | **1** |
| Data Types  Type Conversion(Dynamic, Explicit)  Basic I/O (scanf, printf)  Arithmetic and Logical Expressions  Assignment (concept of r-value, l-value)  Statements |
| **Control Flow** | **2** |
| **Selective Structures**  Conditional Expression and Statements  Nested Conditionals  Multi-way Conditional  **Repetitive Structures**  while loop  do-while loop  for loop  Nested Loops  Loop Interruption (break, continue statements) |
| **Functions** | **2** |
| Function Definition  Function Call (call-by-value)  Function Prototypes (header files)  Recursion |
| **Arrays and Pointers** | **3** |
| Basics of Pointers  Array-Pointer Referencing Duality  Strings  Dynamic Memory Management  Function and Pointers(call-by-reference)  Multidimensional Arrays and Pointers  Pointers to Pointers  Pointer to Functions |
| **Structures and Unions** | **2** | **1** |
| Basics of Structures  Structures and Functions  Structures and Arrays  Self-Referential Structures(Structures Containing Pointers)  Unions |
| **File Processing with C** | **2** |
| Reading From & Writing to Files |

**C++**

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| **Introduction to C++ and Object Oriented Programming** |  | **2-3** |
| Difference between C and C++  Classes  Friendship and Inheritance  Polymorphism |
| **Advanced Concepts** | **3** | **1** |
| Templates  Namespaces  Exceptions  Type Casting |
| **C++ Standard Library** | **1** |
| Input / Output with Files in C++ |
| **Standard Template Library(STL)** | **2-3** |
| **Sequences**  vector  deque  list  **Container Classes**  stack  queue  priority queue  **Associative Containers**  set, multi-set  map, multi-map  **Operations/Utilities**  Iterator  Algorithm |

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|  | Lecture 1 (Thursday)  17:00 - 20:00 | Lecture 2 (Friday)  17:00 - 20:00 | Lecture 3 (Saturday)  09:00 - 12:00 |
| Week 1 | Sept. 6 | Sept. 7 | Sept. 8 |
| Week 2 | Sept. 13 | Sept. 14 | Sept. 15 |
| Week 3 | Sept. 20 | Sept. 21 | Sept. 22 |

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| **Organized by**  Dr. Onur Pekcan  METU Civil Engineering Department  Applied Innovative and Interdisciplinary (AI2)  Research Lab    [www.ai2lab.org](http://www.ai2lab.org) | *This event is sponsored by* | **Contributors**  Dr. Selim Temizer  METU Computer Engineering Department  Mobility Research Lab  http://www.ceng.metu.edu.tr/~temizer/media/MobilityLogo.bmp  mobility.ceng.metu.edu.tr |