**Course Specification**

**(CS 317 : Concepts of Programming )**

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| *University:* | Helwan University |
| *Faculty:* | Faculty of Computers & Information |
| *Department:* | ***Computer science*** |

**1. Course Data**

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| --- | --- |
| **Code:** | **CS 317** |
| **Course title:** | **Concepts of Programming** |
| **Level:** | 1 |
| **Specialization:** | Computer Science |
| **Credit hours:** | 3 hours |
| **Number of learning units (hours):**  | (3) theoretical  |

**2. Course Objective**

Acquainting the students with principles and concepts of different programming languages paradigms including design and implementation issues of different models of programming including structured programming , object-oriented programming, functional and logic programming.

**3. Intended Learning Outcomes:**

* **Knowledge and Understanding:**

A7. Define the basics of Computer Systems.

A8. Apply Programming to solve Problems.

A17. Represent essential knowledge of Translators Design.

* **Intellectual Skills**

B4. Formulate and test Concepts and Hypothesis.

B8. Gather and assess relevant information, using abstract ideas to interpret it effectively.

B10. Distinguish Diagnosis Techniques.

B18. Classify different problems.

* **Professional and Practical Skills**

C1. Choose the appropriate Programming Language.

* **General and Transferable Skills**

D4. Follow Analytical Thinking.

D14. Practice Engineering skills for software development

**4. Course contents**

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **No. of hours** | **Lecture** | **Tutorial/ Practical** |
| Introduction  Evolution of Major Programming Languages | 3 | 1 | 1 |
| Lexical and Syntax Analysis* Describing Syntax, formal definition of languages, BNF and context-free grammars
* Parsing
 | 6 | 2 | 1 |
| Names, Bindings, and Scopes* Names
* Variables
* The Concept of Binding
* Scope
* Scope and Lifetime
* Referencing Environments
* Named Constants
 | 3 | 1 | 1 |
| Data Types* Primitive Data Types
* Character String Types
* User-Defined Ordinal Types
* Array Types
* Associative Arrays
* Record Types
* Union Types
* Pointer and Reference Types
 | 3 | 1 | 1 |
| Expressions and Assignment Statements* Arithmetic Expressions
* Overloaded Operators
* Type Conversions
* Relational and Boolean Expressions
* Short-Circuit Evaluation
* Assignment Statements
 | 3 | 1 | 1 |
| Statement-Level Control Structures* Selection Statements
* Iterative Statements
* Unconditional Branching
* Guarded Commands
 | 6 | 2 | 2 |
| Subprograms* Design Issues for Subprograms
* Local Referencing Environments
* Parameter-Passing Methods
* Parameters That Are Subprograms
* Overloaded Subprograms
* Generic Subprograms
* Stack-Dynamic Local Variables
* Nested Subprograms
* Dynamic Scoping
 | 6 | 2 | 1 |
| Abstract Data Types and Encapsulation Concepts* Data Abstraction
* Design Issues for Abstract Data Types
* Language Examples
* Parameterized Abstract Data Types
* Encapsulation Constructs
* Naming Encapsulations
 | 6 | 2ss | 1 |
| * Object-Oriented Programming
* Examples from different OO languages such as C++, Java, C#,…
* Implementation of Object-Oriented Constructs
 | 3 | 1 | 1 |
| Overview of other types of programming * Functional programming
* Logic programming
* Concurrent programming
 | 6 | 2 | 2 |

**Mapping contents to ILOs**

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| --- | --- |
| Topic | Intended Learning Outcomes (ILOs) |
| Knowledge and understanding | Intellectual Skills | Professional and practical skills | General and Transferable skills |
| Introduction  Evolution of Major Programming Languages | A7,A8,A17 | B4 | C1 | D4 |
| Lexical and Syntax Analysis* Describing Syntax, formal definition of languages, BNF and context-free grammars
* Parsing
 |  A7 | B8 | C1 | D14 |
| Names, Bindings, and Scopes* Names
* Variables
* The Concept of Binding
* Scope
* Scope and Lifetime
* Referencing Environments
* Named Constants
 | A7 | B8 | C1 | D4 |
| Data Types* Primitive Data Types
* Character String Types
* User-Defined Ordinal Types
* Array Types
* Associative Arrays
* Record Types
* Union Types
* Pointer and Reference Types
 | A8 | B10 | C1 | D14 |
| Expressions and Assignment Statements* Arithmetic Expressions
* Overloaded Operators
* Type Conversions
* Relational and Boolean Expressions
* Short-Circuit Evaluation
* Assignment Statements
 | A17, A7 | B18 | C1 | D4 |
| Statement-Level Control Structures* Selection Statements
* Iterative Statements
* Unconditional Branching
* Guarded Commands
 | A8, A7 | B4 | C1 | D14 |
| Subprograms* Design Issues for Subprograms
* Local Referencing Environments
* Parameter-Passing Methods
* Parameters That Are Subprograms
* Overloaded Subprograms
* Generic Subprograms
* Stack-Dynamic Local Variables
* Nested Subprograms
* Dynamic Scoping
 | A17,A7 | B8 | C1 | D4 |
| Abstract Data Types and Encapsulation Concepts* Data Abstraction
* Design Issues for Abstract Data Types
* Language Examples
* Parameterized Abstract Data Types
* Encapsulation Constructs
* Naming Encapsulations
 | A7, A7 | B10 | C1 | D14 |
| * Object-Oriented Programming
* Examples from different OO languages such as C++, Java, C#,…
* Implementation of Object-Oriented Constructs
 | A17, A8 | B18 | C1 | D14 |
| Overview of other types of programming * Functional programming
* Logic programming
* Concurrent programming
 | A17,A7,A8 | B4, B8 | C1 | D4, D14 |

**5. Teaching and Learning Methods**

Class Lectures

 Highly lab-based courses

Tutorials

**6. Teaching and Learning Methods for students with limited capability**

 Using data show

 e-learning management tools

**7. Students Evaluation**

**a) Used Methods**

Lab exam

Assignments

Lab work

Programming projects

**b) Time**

Assessment 1: Test 1 Week 4

Assessment 2: Test 2 Week 7

Assessment 3: Midterm Exam Week 10

Assessment 4: Practical Exam Week 14

Assessment 5: final written exam Week 16

**c) Grades Distribution**

Mid-term Examination 20 %

Final-Year Examination 50 %

Semester Work 20 %

Practical Exam 10%

 Total 100%

 Any formative only assessments

**List of Books and References**

**a) Notes**

Course Notes

- Handouts

**b) Mandatory Books**

Robert Sebesta, Concepts of Programming Languages, 7th Edition, Addison Wesley 2005.

**c) Suggested Books**

- [Franklyn A. HYPERLINK "http://www.amazon.com/Franklyn-A.-Turbak/e/B001J3NUBS/ref=ntt\_athr\_dp\_pel\_1"Turbak](http://www.amazon.com/Franklyn-A.-Turbak/e/B001J3NUBS/ref%3Dntt_athr_dp_pel_1) , [David K. Gifford](http://www.amazon.com/s/ref%3Dntt_athr_dp_sr_2?_encoding=UTF8&sort=relevancerank&search-alias=books&field-author=David%20K.%20Gifford), Design Concepts in Programming Languages , MIT Press , 2008

- [Peter Van Roy](http://www.info.ucl.ac.be/~pvr) and [SeifHYPERLINK "http://www.sics.se/~seif" HYPERLINK "http://www.sics.se/~seif"Haridi](http://www.sics.se/~seif), Concepts , Techniques and models of Computer Programming, MIT Press, 2004.

Periodicals, Web Sites, … etc

- <http://www.aw-bc.com/sebesta/>

**d) Other publications**

**Course Coordinator:**  Dr. Amal Aboutabl

**Chairman of the Department:** Prof. dr. Iraqy Khalifa