# Level 3 - Open Systems in Computing

### Level 3

## Level 3, Unit 1 - Computational Thinking (10 credits)

| 1. understand the computational problem solving process. | 2. be able to apply number systems and logic to computing problems. | 3. analyse problems to create computational solutions. |
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| 1.1 consult with relevant industry professionals and academics to improve solutions. [1] | 2.1 use mathematical functions in practical algorithms. [2] | 3.1 explain computational solutions in terms of sequential automated steps. [3] |
| 1.2 iteratively refine solutions to improve efficiency and effectiveness. [4] | 2.2 explain how digital computers can work with a full range of real numbers. [5] | 3.2 identify practical problems suitable for a computational solution. [6] |
| 1.3 organise data in terms of logical patterns. [7] | 2.3 analyse expressions in boolean logic to simplify them. [8] | 3.3 find ways of making computational solutions more efficient. [9] |
| 1.4 use multiple algorithms to solve complex problems. [10] | 2.4 explain the difference between packed and unpacked binary coded decimal. [11] | 3.4 analyse complex problems into simpler related components. [12] |
| 1.5 demonstrate how abstractions represent complex data structures and instructions. [13] | 2.5 explain the relationship between binary and hexadecimal numbers. [14] | 3.5 work collaboratively and persistently to achieve a good computational solution. [15] |

## Level 3, Unit 2 - Principles of Software Engineering (10 credits)

| 1. understand the role of the target audience. | 2. understand strategies for maintaining quality. | 3. adopt suitable methods to match circumstances. |
|---|---|---|
| 1.1 describe methods for | 2.1 explain and | 3.1 specify a |

| | | |
|---|---|---|
| providing feedback to users from errors in the code. [17] | demonstrate the importance of courage and persistence in solving problems. [18] | documentation strategy. [19] |
| 1.2 receive user feedback and act positively. [20] | 2.2 explain a sound testing strategy. [21] | 3.2 compare procedural and object oriented programming. [22] |
| 1.3 describe the rationale for release early, release often. [23] | 2.3 demonstrate quality strategies through small scale projects. [24] | 3.3 describe an open source community project and its methods. [25] |
| 1.4 compare the user role in a range of software development models. [26] | 2.4 establish clear communication channels with critical reviewers. [27] | 3.4 compare formal and agile methods. [28] |
| 1.5 explain principles of user interface design. [29] | 2.5 identify design techniques to reduce risk. [30] | 3.5 explain the different demands of large scale and small scale projects. [31] |

# Level 3, Unit 3 - Delivering a Software Project (10 credits)

| 1. plan a suitable project. | 2. carry out a significant practical software project. | 3. communicate project outcomes to others. |
|---|---|---|
| 1.1 meet deadlines. [33] | 2.1 show courage and determination to overcome problems. [34] | 3.1 gather opinions through peer review. [35] |
| 1.2 present the proposal to critical experts. [36] | 2.2 produce source code that has effective embedded documentation. [37] | 3.2 provide regular updates on progress to a mentor. [38] |
| 1.3 identify an area of interest and scope the project. [39] | 2.3 test code regularly involving third parties. [40] | 3.3 use IT tools to enhance communication. [41] |
| 1.4 make modifications as a result of feedback. [42] | 2.4 use logical techniques to debug code. [43] | 3.4 analyse issues arising and establish priorities for resolution. [44] |
| 1.5 agree and adopt the software development method. [45] | 2.5 produce substantial code that works effectively. [46] | 3.5 make a final presentation to a critical audience. [47] |

# Level 3, Unit 4 - Open Systems and Community Development (10 credits)

### 1. understand the process of community development.

1.1 explain the importance of distributed revision control systems in community software development. [49]

1.2 explain the relationships between commercial and volunteer interests in a software development community. [52]

1.3 compare and contrast the processes of software development communities. [55]

1.4 describe Sourceforge and its role in community development. [58]

1.5 explain the principles of the Open Source Way. [61]

### 2. understand licensing and intellectual property.

2.1 describe the advantages and disadvantages of software patents. [50]

2.2 describe and explain the freedoms associated with free and open source software. [53]

2.3 explain the terms trademark, copyleft, creative commons, and public domain. [56]

2.4 analyse the effects of digital technologies on the enforcement of intellectual property rights. [59]

2.5 explain the relationship between copyright and licensing. [62]

### 3. understand commercial models for software development.

3.1 describe the perpetual license model for software development. [51]

3.2 describe the dual licensing model for software development. [54]

3.3 describe the fremium model for software development. [57]

3.4 describe the software as a service model. [60]

3.5 describe an advertising model to support software development. [63]

# Level 3, Unit 5 - Computer Systems Management (10 credits)

### 1. set up systems.

### 2. support system storage and security.

### 3. maintain systems.

### 4. understand key internet systems.

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| 1.1 solve problems in systems setup and configuration. [65] | 2.1 write a risk assessment for system security including passwords and malware. [66] | 3.1 set up a secure virtual connection to manage a system from a remote location. [67] | 4.1 explain the role of an internet service provider. [68] |
| 1.2 customise the display to personal preference. [69] | 2.2 devise and implement a backup strategy. [70] | 3.2 install software updates and dependencies. [71] | 4.2 explain the importance of TCP/IP. [72] |
| 1.3 install and set up an operating system. [73] | 2.3 describe a range of storage methods and their strengths and weaknesses. [74] | 3.3 install and remove applications. [75] | 4.3 describe the terms HTML, W3C and HTTP. [76] |
| 1.4 set up network connections. [77] | 2.4 set up and understand how to customise a firewall for network connection. [78] | 3.4 set up cron jobs to automate regular procedures. [79] | 4.4 explain the effects of proprietary standards and lock-in. [80] |
| 1.5 set and customise boot sequence and options. [81] | 2.5 format and partition storage devices. [82] | 3.5 provide effective support for system users. [83] | 4.5 explain the function of a web server. [84] |



**Links**
[1] https://theingots.org/community/cpl3u1ctx#1.1
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[3] https://theingots.org/community/cpl3u1ctx#3.1
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