## Computer Systems Engineering wIE MEng (Hons) options 2018-2019

### Level 1 - compulsory units
All of the units in this pool are mandatory.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP10120</td>
<td>First Year Team Project</td>
<td>20</td>
</tr>
<tr>
<td>COMP11120</td>
<td>Mathematical Techniques for Computer Science</td>
<td>20</td>
</tr>
<tr>
<td>COMP11212</td>
<td>Fundamentals of Computation</td>
<td>10</td>
</tr>
<tr>
<td>COMP12111</td>
<td>Fundamentals of Computer Engineering</td>
<td>10</td>
</tr>
<tr>
<td>COMP14112</td>
<td>Fundamentals of Artificial Intelligence</td>
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</tr>
<tr>
<td>COMP15111</td>
<td>Fundamentals of Computer Architecture</td>
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<tr>
<td>COMP16121</td>
<td>Object Oriented Programming with Java 1</td>
<td>20</td>
</tr>
<tr>
<td>COMP16212</td>
<td>Object Oriented Programming with Java 2</td>
<td>10</td>
</tr>
<tr>
<td>COMP18112</td>
<td>Fundamentals of Distributed Systems</td>
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</table>

### Level 2 options
This programme requires 2 themes to be completed from the following list.

- Computer Architecture (COMP25111, COMP25212 & COMP35112)
- System-on-Chip (COMP22111 & COMP32211)

### Level 2 - compulsory units
All of the units in this pool are mandatory.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP22111</td>
<td>Processor Microarchitecture</td>
<td>10</td>
<td>System-on-Chip</td>
</tr>
<tr>
<td>COMP22712</td>
<td>Microcontrollers</td>
<td>10</td>
<td>None</td>
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<tr>
<td>COMP23111</td>
<td>Fundamentals of Databases</td>
<td>10</td>
<td>Web and Distributed Systems</td>
</tr>
<tr>
<td>COMP23311</td>
<td>Software Engineering 1</td>
<td>10</td>
<td>Agile Methods</td>
</tr>
<tr>
<td>COMP23412</td>
<td>Software Engineering 2</td>
<td>10</td>
<td>Agile Methods</td>
</tr>
<tr>
<td>COMP25111</td>
<td>Operating Systems</td>
<td>10</td>
<td>Computer Architecture</td>
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<tr>
<td>COMP25212</td>
<td>System Architecture</td>
<td>10</td>
<td>Computer Architecture</td>
</tr>
<tr>
<td>COMP26120</td>
<td>Algorithms and Imperative Programming</td>
<td>20</td>
<td>Computer Languages</td>
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<tr>
<td>COMP26512</td>
<td>Mobile Systems</td>
<td>10</td>
<td>Mobile Computing and Networks</td>
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### Level 2 - option pool 1
From this option pool choose a maximum of 10 credits and a minimum of 0 credits.

<table>
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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>COMP21111</td>
<td>Logic and Modelling</td>
<td>10</td>
<td>Rigorous Development</td>
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<tr>
<td>COMP24111</td>
<td>Machine Learning and Optimisation</td>
<td>10</td>
<td>Learning and Search in Artificial Intelligence</td>
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<tr>
<td>BMAN10011</td>
<td>Fundamentals of Management</td>
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<tr>
<td>BMAN10621B</td>
<td>Fundamentals of Financial Reporting</td>
<td>10</td>
<td>None</td>
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<tr>
<td>BMAN20811</td>
<td>Managing Business Operations</td>
<td>10</td>
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<tr>
<td>BMAN20821</td>
<td>New Product Development and Innovation</td>
<td>10</td>
<td>None</td>
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<tr>
<td>BMAN21006</td>
<td>Introduction to Management Information Systems</td>
<td>10</td>
<td>None</td>
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<tr>
<td>UCIL10201</td>
<td>Language, Mind and Brain</td>
<td>20</td>
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<tr>
<td>UCIL10221</td>
<td>Science and the Modern World</td>
<td>10</td>
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<tr>
<td>UCIL20001</td>
<td>Leadership of Learning</td>
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<tr>
<td>UCIL20021</td>
<td>Leadership in Action</td>
<td>10</td>
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<tr>
<td>UCIL20031</td>
<td>Leadership in Action Online Unit</td>
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<tr>
<td>UCIL20111</td>
<td>Core Themes in Animation and Visual Culture of Post War Japan</td>
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<tr>
<td>UCIL20211</td>
<td>Are we alone?</td>
<td>10</td>
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<tr>
<td>UCIL20331</td>
<td>From Cholera to Aids: A Global History of Epidemics</td>
<td>10</td>
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<tr>
<td>UCIL21301</td>
<td>Communicating with Confidence</td>
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<tr>
<td>UCIL21331</td>
<td>Becoming an inspirational individual</td>
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<tr>
<td>UCIL22001</td>
<td>Essential Enterprise</td>
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<tr>
<td>UCIL22501</td>
<td>Global Citizenship and Sustainability</td>
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<tr>
<td>UCIL24141</td>
<td>Science, Technology and Democracy</td>
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<tr>
<td>ULBS20011</td>
<td>Intro to British Sign Language S1</td>
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<tr>
<td>ULCH20021</td>
<td>Post-intermediate Chinese - first semester</td>
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Level 2 - option pool 2
From this option pool choose a maximum of 10 credits and a minimum of 0 credits.

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<tbody>
<tr>
<td>COMP24412</td>
<td>Symbolic AI</td>
<td>10</td>
<td>Natural Language, Representation and Reasoning</td>
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<tr>
<td>COMP27112</td>
<td>Computer Graphics and Image Processing</td>
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<td>Visual Computing</td>
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<tr>
<td>COMP28112</td>
<td>Distributed Computing</td>
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<td>Web and Distributed Systems</td>
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<tr>
<td>BMAN10252</td>
<td>Fundamentals of Technological Change</td>
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<td>BMAN10552</td>
<td>Fundamentals of Finance</td>
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<td>BMAN10612</td>
<td>Business Economics</td>
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<td>BMAN10632</td>
<td>Fundamentals of Accounting</td>
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<td>BMAN20242</td>
<td>Introduction to Corporate Finance &amp; Financial Instruments</td>
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<td>BMAN20792</td>
<td>Technology Strategy &amp; Innovation 1</td>
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<td>BMAN20832</td>
<td>Marketing</td>
<td>10</td>
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<td>BMAN20842</td>
<td>Organisations and Employment</td>
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<td>Global Contexts of Business and Management</td>
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<td>Leadership in Action</td>
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<td>Leadership in Action Online Unit</td>
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<td>UCIL20092</td>
<td>The Crisis of Nature: Issues in Environmental History</td>
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<td>UCIL20102</td>
<td>Multilingual Manchester</td>
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<td>UCIL20112</td>
<td>Mental Health</td>
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<td>UCIL20122</td>
<td>AI: Robot Overlord, Replacement or Colleague?</td>
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<td>UCIL20282</td>
<td>The Information Age</td>
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<td>UCIL21002</td>
<td>Leadership of Learning</td>
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<td>UCIL21202</td>
<td>Bioethics: Contemporary Issues in Science and Biomedicine</td>
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<td>UCIL21302</td>
<td>Communicating with Confidence</td>
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<td>UCIL21802</td>
<td>Body, Health and Well-Being</td>
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<td>UCIL22002</td>
<td>Essential Enterprise</td>
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<td>UCIL23302</td>
<td>Science and Civilisation in East Asia</td>
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<td>UCIL24002</td>
<td>The Art of Enterprise</td>
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<td>UCIL25002</td>
<td>The Digital Society</td>
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<td>UCIL29002</td>
<td>Physics &amp; The Grand Challenges of Today</td>
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<td>Introduction to Spoken Arabic</td>
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<td>British Sign Language</td>
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<td>ULBS20022</td>
<td>Introduction to British Sign Language - Part 2</td>
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<td>Introduction to Spoken Chinese</td>
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<tr>
<td>ULFR10022</td>
<td>Introductory French</td>
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<tr>
<td>ULFR10032</td>
<td>Introductory Arabic</td>
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<td>ULGE10012</td>
<td>Beginners' Arabic</td>
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<tr>
<td>ULGE10022</td>
<td>Introductory German</td>
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<td>ULFR11010</td>
<td>Beginners' French</td>
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<td>ULFR20010</td>
<td>Intermediate Business French</td>
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<td>ULFR20020</td>
<td>Post-Intermediate French</td>
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<tr>
<td>ULFR20030</td>
<td>Further French</td>
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Level 2 - option pool 3
From this option pool choose a maximum of 20 credits and a minimum of 0 credits.

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<tr>
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<tbody>
<tr>
<td>ULAR10010</td>
<td>Beginners' Arabic</td>
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<td>ULAR10020</td>
<td>Elementary Arabic</td>
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<tr>
<td>ULAR11010</td>
<td>Beginners' Arabic</td>
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<tr>
<td>ULAR20110</td>
<td>Intermediate Arabic</td>
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<td>ULAR20210</td>
<td>Pre-intermediate Arabic</td>
<td>20</td>
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<tr>
<td>ULAR21110</td>
<td>Intermediate Arabic NC</td>
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<td>ULCH10200</td>
<td>Beginners' Mandarin Chinese</td>
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<td>ULCH20020</td>
<td>Post-intermediate Mandarin Chinese</td>
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<td>ULCH20110</td>
<td>Pre-intermediate Mandarin Chinese</td>
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<td>ULDU10010</td>
<td>Beginners' Dutch</td>
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<td>Intermediate Dutch</td>
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<td>Beginners' French</td>
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<td>Intermediate Business French</td>
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<td>ULFR20030</td>
<td>Further French</td>
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</table>
Level 3 options
This programme requires 2 themes to be completed from the following list.

* Computer Architecture (COMP25111, COMP25212 & COMP35112)
* System-on-Chip (COMP22111 & COMP32211)

Level 3 - compulsory units
All of the units in this pool are mandatory.

<table>
<thead>
<tr>
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<th>Title</th>
<th>Credits</th>
<th>Theme</th>
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<tbody>
<tr>
<td>COMP30040</td>
<td>3rd Year Project (Single Honours 40 Credits)</td>
<td>40</td>
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<tr>
<td>COMP32211</td>
<td>Implementing System-on-Chip Designs</td>
<td>10</td>
<td>System-on-Chip</td>
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<tr>
<td>COMP35112</td>
<td>Chip Multiprocessors</td>
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<td>Computer Architecture</td>
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<tr>
<td>MCEL30031</td>
<td>Enterprise Management for Computer Scientists</td>
<td>10</td>
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<tr>
<td>MCEL30032</td>
<td>Managing Finance in Enterprises for Computer Scientists</td>
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Level 3 - option pool 1
From this option pool choose a maximum of 20 credits and a minimum of 10 credits.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMP33511</td>
<td>User Experience</td>
<td>10</td>
<td>Interactive Systems Design</td>
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<tr>
<td>COMP37111</td>
<td>Agile Software Engineering</td>
<td>10</td>
<td>Agile Methods</td>
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<tr>
<td>COMP36111</td>
<td>Advanced Algorithms 1</td>
<td>10</td>
<td>Programming and Algorithms</td>
</tr>
<tr>
<td>COMP37111</td>
<td>Advanced Computer Graphics</td>
<td>10</td>
<td>Visual Computing</td>
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<tr>
<td>COMP38411</td>
<td>Cryptography and Network Security</td>
<td>10</td>
<td>Mobile Computing and Networks</td>
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</table>

Level 3 - option pool 2
From this option pool choose a maximum of 20 credits and a minimum of 10 credits.

<table>
<thead>
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<th>Title</th>
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<tbody>
<tr>
<td>COMP34412</td>
<td>Natural Language Systems</td>
<td>10</td>
<td>Natural Language, Representation and Reasoning</td>
</tr>
<tr>
<td>COMP36212</td>
<td>Advanced Algorithms 2</td>
<td>10</td>
<td>Programming and Algorithms</td>
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<tr>
<td>COMP36512</td>
<td>Compilers</td>
<td>10</td>
<td>Computer Languages</td>
</tr>
<tr>
<td>COMP37212</td>
<td>Computer Vision</td>
<td>10</td>
<td>Visual Computing</td>
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</table>
Level 3 - option pool 3
From this option pool choose a maximum of 40 credits and a minimum of 0 credits.

<table>
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<tbody>
<tr>
<td>COMP34120</td>
<td>AI and Games</td>
<td>20</td>
<td>Learning and Search in Artificial Intelligence</td>
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<tr>
<td>COMP38120</td>
<td>Documents, Services and Data on the Web</td>
<td>20</td>
<td>Web and Distributed Systems</td>
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</table>

You should aim to do 45 or 60 credits in each of semester 1 and semester 2.

Pools 1 to 4 map to periods 1 to 4 in the PGT timetable. You must pick exactly one module from Pool 5 avoiding timetable clashes.

Mandatory units - 40 credits
Optional units - 90 credits (6 course units)

Level 4 - compulsory units
All of the units in this pool are mandatory.

<table>
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<tr>
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<tr>
<td>COMP40901</td>
<td>UG MEng Industrial Project</td>
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<tr>
<td>MCEL40042</td>
<td>Business Feasibility Study</td>
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Level 4 - option pool 1
From this option pool choose a maximum of 30 credits and a minimum of 15 credits.

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<tbody>
<tr>
<td>COMP60411</td>
<td>Modelling data on the web</td>
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<tr>
<td>COMP60611</td>
<td>Parallel Programs and their Performance</td>
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<tr>
<td>COMP60711</td>
<td>Data Engineering</td>
<td>15</td>
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<tr>
<td>COMP61011</td>
<td>Foundations of Machine Learning</td>
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<tr>
<td>COMP61411</td>
<td>Cryptography</td>
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Level 4 - option pool 2
From this option pool choose a maximum of 30 credits and a minimum of 15 credits.

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<tr>
<td>COMP60621</td>
<td>Designing for Parallelism and Future Multi-core Computing</td>
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<tr>
<td>COMP61021</td>
<td>Modelling and visualisation of high-dimensional data</td>
<td>15</td>
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<td>COMP61421</td>
<td>Cyber Security</td>
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<td>COMP62421</td>
<td>Querying Data on the Web</td>
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Level 4 - option pool 3
From this option pool choose a maximum of 30 credits and a minimum of 0 credits.

<table>
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<tbody>
<tr>
<td>COMP60332</td>
<td>Automated Reasoning and Verification</td>
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<tr>
<td>COMP60532</td>
<td>Principles of Digital Biology</td>
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</tr>
<tr>
<td>COMP61232</td>
<td>Mobile and Energy Efficient Systems</td>
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<td>COMP61332</td>
<td>Text Mining</td>
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<td>COMP62532</td>
<td>Component-based Software Development</td>
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Level 4 - option pool 4
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<td>COMP60542</td>
<td>Introduction to Health Informatics</td>
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<td>COMP61242</td>
<td>Mobile Communications</td>
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<tr>
<td>COMP61342</td>
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Level 4 - option pool 5
From this option pool choose 15 credits.

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<th>Code</th>
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<td>Risk, Performance and Decision Analysis</td>
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<td>Data Analytics for Business Decision Making</td>
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<td>MCEL63402</td>
<td>Essential Risk Management for Business</td>
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