F29FB Foundations 2

COURSE DETAILS
Course Code: F29FB
Full Course Title: Foundations 2
SCQF Level: 9
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: Yes  Postgraduate Taught: No  Postgraduate Research: No

Additional Information:

COURSE AIMS

• To ensure students correctly understand the needed mathematics, in particular: functions and how to logically specify them.
• To understand computability.
• To understand a specific model of computability: Turing machines.
• To understand the limits of computability and how we know these limits.

LEARNING OUTCOMES – SUBJECT MASTERY

• Understanding functions and gaining competence with recognizing, specifying, and using them.
• Understanding how computation and its limits are mathematically modeled and reasoned about.

LEARNING OUTCOMES – PERSONAL ABILITIES

• Awareness of the limits of computing and how to assess whether a problem is solvable at all.
• Increased fluency in reading theoretical research in the field.

SYLLABUS

Mathematical background; enumerability; countable and uncountable sets; diagonalization; Gödel numbering; Turing machines (TMs); computable and uncomputable functions; Turing computability; the Halting Problem; solvability and reduction of decision problems; Church’s thesis and effective computability; nondeterministic TMs; P = NP?

COURSE RELATIONSHIPS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Level</th>
<th>Title</th>
<th>School</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>F17SC</td>
<td>7</td>
<td>Discrete Mathematics</td>
<td>School of Math and Comp Sci.</td>
<td>Pre-Requisite</td>
</tr>
<tr>
<td>F17LP</td>
<td>7</td>
<td>Logic and Proof</td>
<td>School of Math and Comp Sci.</td>
<td>Pre-Requisite</td>
</tr>
</tbody>
</table>

LOCATION AND ASSESSMENT METHODS

<table>
<thead>
<tr>
<th>Edi</th>
<th>SBC</th>
<th>Ork</th>
<th>Dub</th>
<th>Malay</th>
<th>IDL</th>
<th>COLL</th>
<th>ALP</th>
<th>OTH</th>
<th>Method</th>
<th>Weight</th>
<th>Exam Mins</th>
<th>Type</th>
<th>Diet</th>
<th>Synoptic Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Examination</td>
<td>70</td>
<td>120</td>
<td>Assessment</td>
<td>Semester 2</td>
<td></td>
</tr>
</tbody>
</table>
### F29FB Foundations 2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>Coursework</th>
<th>30</th>
<th>Assessment</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Y</td>
<td></td>
<td>Examination</td>
<td>100</td>
<td>Reassessment</td>
<td>Semester 3</td>
</tr>
</tbody>
</table>