RESEARCH SCHOOL OF COMPUTER SCIENCE (RSCS)
CURRICULUM DEVELOPMENT COMMITTEE

Meeting No.3/2016 of the RSCS Curriculum Development Committee will be held on

Thursday 14 April 2016 at 12pm
in Room B123, RSISE Building (115).

Apologies and enquiries should be sent to: Elizabeth.Nunrom@anu.edu.au

---

**Agenda Summary**

**Part 1 – Procedural matters**

1. Announcements and Apologies | For information | 2
2. Minutes | For decision | 2
   *Recommendation: That the Committee confirm the minutes of the meeting 2/2016.*
   *Attachment: Minutes of RSCS CDC Meeting 2/2016* | | 3
3. Matters Arising from Minutes and Action Items | For information | 2
   *Attachment: Action Item list of RSCS CDC Meetings* | | 9
4. Confidential Items | For information | 2

**Part 2 – Reports**

5. Report from the Chair | For information | |
6. Report from Program Convenors | For information | |

**Part 3 – Curriculum Proposals**

7. Curriculum Proposals | For decision | 11
   *Recommendation: That the Committee.*
   *Attachment: Appendix 7A – RSCS Curriculum Proposals* | | 13

**Part 4 – Items of other business**

8. Meeting Dates | For information | 134
9. Other business and question time | For discussion | 134
Part 1 – Procedural matters

* Item 1 Announcements and apologies

1.1 Apologies
To be received

1.2 Announcements

* Item 2 Minutes

The minutes of meeting of the RSCS CDC Committee 1/2016 held on 25 February 2016 are to be confirmed.

Recommendation

That the Committee confirm the minutes of the meeting 1/2016.

ACTION REQUIRED

For discussion ☐  For decision ☑  For information ☐  School response ☐

Item 3 Matters Arising from the Minutes

For the Committee to raise and note any matters arising from the Minutes.

3.1 Action Item List

Item 5 Confidential items

Consistent with the policy and practice of Council, all matters in the agenda of the University Education Committee relating to individual persons, including appointments, enrolment, candidacy for degrees, personal details, performance and conduct are declared to be confidential. If any member wishes to raise a confidential matter in relation to any other item, he or she should do so under this Item. After consideration of the confidential items, observers will be admitted to the meeting.
Meeting No. 2/2016 of the Research School of Computer Science Curriculum Development Committee was held on Thursday 24 March 2016 at 12pm in Room B123, RSISE Building (115).


In Attendance: Mrs Elizabeth Nunrom, Jochen Trumpf.

Absent: Tom Gedeon, Lynette Johns-Boast, Alexander Richardson, Klaus Weber

PART 1 – PROCEDURAL MATTERS

ITEM 1 WELCOMES, ANNOUNCEMENTS AND APOLOGIES

1.1 Welcomes and Apologies
Apologies were received from Lynette Johns-Boast and Klaus Weber.

1.2 Announcements
There were no announcements

ITEM 2 MINUTES

The Committee resolved to confirm the minutes of meeting 1/2016 of the RSCS Curriculum Development Committee held on 25 February 2016.

ITEM 3 MATTERS ARISING FROM THE MINUTES AND ACTION ITEMS

The Chair gave and received updates on the current action item list. The updated list is attached to these Minutes.

ITEM 4 CONFIDENTIAL ITEMS

There were no confidential items
PART 2 REPORTS

ITEM 5  REPORT FROM THE CHAIR

The Chair briefed the Committee on the following items:

**CAAC Item 6: Report on Issues in Various Media Reports on ATAR and University Admissions**
The University has developed an FAQ document answering questions about how ATARS and Bonus points are utilised. This document will be made available to all on a website.

**CAAC Item 7: Admission Incident Report** – Admissions had identified that forged HDR referee reports are a prevalent type of fraud and have encouraged Colleges to have a plan to monitor this.

**CAAC Item 9: Review of Admission Requirements for Graduate Coursework Programs** – It has been proposed that the new default entry requirements for Graduate Coursework Programs should be as follows:
- GPA 4 for Graduate Certificate and Graduate Diploma programs (WAM of approximately 50%)
- GPA 5 for Masters programs (WAM of approximately 60%)
- GPA 6 for Masters (Advanced) (WAM of approximately 70%)

All programs which do not comply with these defaults will need to justify their entry requirements on an annual report. The Committee accepted the default for the Masters programs, noting that CECS is able to set different entry requirements and corresponding international equivalencies. The Committee noted that, as CECS does not have a Masters (Advanced) degree, the GPA for that program was not applicable.

**Resolution:**
The Curriculum Development Committee resolved to note the report.

ITEM 6  REPORT FROM THE PROGRAM CONVENORS

6.1 Eric McCreath – BAC (HONS) and BAC R&D
- The welcome for BAC R&D students was well attended
- There were approximately 13-15 students in the program
- Eight BAC students from Shandong University had failed the same course. Enrolment solutions to this were being investigated, including overloading. The Committee discussed this, noting that advising any student to overload is not recommended and that the choice to overload should always be made by the student. Given the requirements students must meet before being permitted to overload, waiting for Semester 1 results to be published was recommended before this option was mentioned. It was also noted that, unless the failure was somehow contributed to by an action of the College, there was no obligation to go to extra lengths to find a solution.

**Action:** Paul Melloy to provide accurate enrolment numbers for the R&D program

6.2 John Slaney – Honours convenor
- It took a long time for students to get settled into the program this year
- Approximately 20 students are enrolled, which is normal for this program
- The initial presentations have been completed
- All students have supervisors and have been allocated space
6.3 Shayne Flint – Bachelor of Software Engineering

- All progressing normally
- Students at the end of their program trying to pick easier courses
- Noticed a trend developing where students are wanting to do a late change of courses. The reason given for this is the course is, although the course is not too hard, it is taking too much time.

Resolution:
The Curriculum Development Committee resolved to note the reports and associated actions

PART 3 CURRICULUM PROPOSALS

ITEM 7 PROGRAM REVIEW

The Chair advised the Committee that the review documents for the Bachelor of Software Engineering was complete, with the documents for the Bachelor of Advanced Computing (Hons) (R&D) to be circulated later.

The Committee discussed the documents, including the following discussion points:

- There was alignment between the assessment in Honours courses and Honours plan learning outcomes but this has not been formally documented
- Proposed enrolment targets may be more important in the future than now, so they should be considered carefully
- When setting enrolment targets, the fact that the VC wants to maintain UG enrolment numbers at the current level, should be considered
- The difficulty in setting enrolment targets with the upcoming comprehensive curriculum changes, which may cause behaviour shifts
- The average of the SELS results for COMP3100/4500 is over 50%

Resolution:
The Curriculum Development Committee resolved to update the review documents to reflect that the enrolment target would be 10%, justified by the new building to attract students, new curriculum changes, and the fact that enrolment in COMP1100 was up 70%.

PART 4 EDUCATION POLICY AND RELATED ISSUES

ITEM 8 CECS INTERSHIPS GUIDELINES

The Chair spoke to this item, noting that the guidelines had been developed by the new Subdean, Engaged Learning and were compatible with the University level principles. The Committee discussed the guidelines. Discussion points included:

- The possibility of having a changing the 24 unit internship course to a variable unit course
• The considerable difference with the CBE model where:
  o Industry partners pay to get access to interns
  o CBE is trying to make the internship accessible to all students
  o It is not a required course, students opt in
• The different between work experience (not for credit) and internships (for credit and is managed before, throughout and after placement)
• The lack of interest from CS students in Internships, with a lot of students already having jobs or involved in projects
• The possibility that students do too many projects
• Identifying the best time to do an internship as being in 3rd year
• The necessity of considering double degree students when looking at internships
• The necessity of reviewing the learning outcomes to find equivalencies with other courses. This would allow for more student engagement, as exemptions would be possible.
• The possibility of students being able to study something not offered by RSCS whilst on internship
• The different structural options for fitting an internship in a program – either case by case approval by convenor, or as a defined pathway within a program

Resolution:
The Committee resolved that any further feedback on the CECS Internships Guidelines should be sent to Natalie.Young@anu.edu.au by 31 March

ITEM 9 GHOST WRITING

The Committee discussed the issue of Ghost Writing, with discussion including the following points:
• The difficulty in detecting instances of Ghost Writing
• Methods to address Ghost Writing
  o Increase percentage of exams or other ID assured assessment
  o One-on-one interviews
  o Randomly select for oral exams
  o ‘Name and shame’ offenders
  o Education regarding plagiarism, including Ghost Writing, and the consequences
• Noting that some courses only have continuous assessment

Resolution:
The Curriculum Development Committee resolved to note the discussion and convenors encouraged to implement methods to address Ghost Writing within the School

ITEM 10 INHERENT REQUIREMENTS

The Committee discussed Inherent Requirements, noting that these were the basic capabilities required to do a program, physical and mental capabilities which could not be reasonably adjusted and still achieve the required learning outcomes. The risk in not articulating these requirements is that the College could be forced to make adjustments in order to allow students who do not have these capabilities to undertake and complete the program. Discussion points included:
• The aim is to be inclusive and make adjustments where possible
• The question ‘Is this more a language-based course than a math-based course?’, frequently asked by students, not being an issue legally, but may be addressed through introduction or pathway courses
• The possibility of the ability to relate to people in small groups being an inherent requirement
The Associate Dean (Education) noted that the process going forward would be to identify course types within the College and then source inherent requirements for these course types from UQ or UTS in order to build up a default list. These would then be sent around to convenors for review. Someone in each School would drive the process and high-risk courses would be identified.

**Resolution:**
The Committee resolved to note the discussion

**ITEM 11 NEW EXAM POLICY**

Recent changes mean that central examinations will no longer schedule examinations where:

- The number of students are less than 20 people
- The weighting of the exam is less than 20%
- The duration of the exam is less than 90 minutes

Discussion points included:

- Co-taught and/or small courses can be combined to make a cohort more than 20 people
- If the above requirements aren’t met, the School will need to bear the cost of invigilation
- The reason for these requirements is unclear, whether it may be for pedagogical or to transfer work
- The new requirements don’t apply for internal, in-class exams, only for centrally invigilated exams
- There are specified weeks in which central will run exams. Should the School wish to run exams in December, the College will need to provide invigilators
- Students services will invigilate exams for individual students wherever possible

**Resolution:**
The Committee resolved to note the discussion

**ITEM 12 RECORDING OF LECTURES POLICY**

The Committee noted the new Recording of Lectures Policy, specifically:

- If located in a recordable venue, the lecture should be recorded
- The only reasons for exemptions were that the mode of teaching made recording unsuitable or that there were third-party IP issues
- An application for rescheduling a course into a non-recording venue would be taken as a request for exemption and could be overruled by the Associate Dean (Education)

**Resolution:**
The Committee resolved to note the discussion

**PART 6 ITEMS OF OTHER BUSINESS**

**ITEM 17 MEETING DATES**

The Committee noted the Meeting dates for 2016

**Resolution:**
The Curriculum Development Committee resolved to note the dates of the 2016 Curriculum Development and College Education Committee meetings
ITEM 18 OTHER BUSINESS AND QUESTION TIME

18.1 Changing of HDR Admission Requirements
Paul Melloy advised the Committee that there was a proposal to change the admission requirements for the MPhil and PhD programs. He noted that the new requirement would be a distinction in a 24 unit research project, and that if a student did not meet this requirement, a case would need to go through the HDR Committee. It was noted that Engineers Australia only required a 12 unit project and that this new proposal did not really cater to Industry.

Action: Any feedback on this proposal should be directed to Henry Gardener.

18.2 New Curriculum changes
The Committee noted that the R&D program had not been specifically considered in the new curriculum changes. They noted that the R&D program had a similar core, but required linear algebra and calculus and two project courses which were the equivalent of Science's Advanced Studies courses. Discussion points included:
- The possibility of including an individual project course or research placement in the program
- The possibility of requiring extra maths/statistics
- The option of recoding COMP2550 and COMP2560 as 4000-level courses
- That industrial experience was necessary in the R&D program but not in the BAC program
- The possibility of inactivating COMP3560 and replacing it with two instances of COMP3710, changing the name to be more attractive to students
- The necessity to review the pre-requisites for specialisations and/or to ensure that the pathway through the specialisation is self-contained

Resolution:
The Curriculum Development Committee resolved to note the discussion

The meeting closed at 2.00pm

EJN 1/04/2016
<table>
<thead>
<tr>
<th>School</th>
<th>Meeting</th>
<th>Item</th>
<th>Action</th>
<th>Responsibility</th>
<th>Due</th>
<th>Status</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSCS</td>
<td>4/2015</td>
<td>3.2</td>
<td>Associate Director (Education) to annotate the Masters Working Group documentation with action items and circulate to the Committee for discussion and action.</td>
<td>Ramesh Sankaranarayana</td>
<td>Not set</td>
<td>Ongoing</td>
<td>A Postgraduate Coursework working party will be held after the Undergraduate Working Party has been completed.</td>
</tr>
<tr>
<td>RSCS</td>
<td>4/2015</td>
<td>5</td>
<td>Position Descriptors to be completed</td>
<td>Ramesh Sankaranarayana</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>4/2015</td>
<td>9</td>
<td>Report of external audit of Honours projects to be written and presented to CDC.</td>
<td>Ramesh Sankaranarayana</td>
<td>22-Jun-16</td>
<td>Ongoing</td>
<td>John Slaney to write a short description of the process for distribution to CDC members</td>
</tr>
<tr>
<td>RSCS</td>
<td>4/2015</td>
<td>11</td>
<td>Student Services to be informed of any course which require course requisite changes</td>
<td>Ramesh Sankaranarayana</td>
<td>Not set</td>
<td>Ongoing</td>
<td>Any changes to be submitted by 29 August</td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>7.1</td>
<td>Jochen Trumpf to show Eric McCreath how to obtain student numbers through ANU Insight</td>
<td>Jochen Trumpf and Eric McCreath</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>7.2</td>
<td>John Slaney to obtain more information regarding the Science Honours application process</td>
<td>John Slaney</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>7.3</td>
<td>Lynette Johns-Boast to speak to Janette Rawlinson regarding the possibility of facilities for MComp (Adv) students.</td>
<td>Lynette Johns-Boast</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>7.3</td>
<td>Paul Melloy to run report to identify students with 24 units remaining in their Master of Computing and a high GPA</td>
<td>Paul Melloy</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>7.4</td>
<td>Jochen Trumpf and Alistair Rendell to discuss issues around the Diploma of Computing further</td>
<td>Jochen Trumpf and Alistair Rendell</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>8.1</td>
<td>Any feedback on the Master of Innovation and Professional Practice to be sent to <a href="mailto:Shayne.Flint@anu.edu.au">Shayne.Flint@anu.edu.au</a> by 10 March 2016</td>
<td>Committee members</td>
<td>10-Mar</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>8.2</td>
<td>John Slaney to review Bachelor of Data, Statistics and Society to ensure that the entry requirements for the Honours plan were satisfied</td>
<td>John Slaney</td>
<td>10-Mar</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>8.2</td>
<td>John Slaney to review all Honours plan Admission requirements in order to ensure that all meeting the Honours Working Party requirements and report back to RSCS CDC 2/2016</td>
<td>John Slaney</td>
<td>15-Mar</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>8.2</td>
<td>Any feedback on the Bachelor of Data, Statistics and Society (Honours) to be sent to <a href="mailto:Elizabeth.Nunrom@anu.edu.au">Elizabeth.Nunrom@anu.edu.au</a> by 10 March 2016</td>
<td>Committee members</td>
<td>10-Mar</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>School</td>
<td>Meeting</td>
<td>Item</td>
<td>Action</td>
<td>Responsibility</td>
<td>Due</td>
<td>Status</td>
<td>Notes</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>------</td>
<td>--------</td>
<td>---------------</td>
<td>-----</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>9</td>
<td>The Curriculum Development Committee resolved that Student Services would be requested to assist in providing proposal templates</td>
<td>Student Services</td>
<td>As soon as possible</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>9</td>
<td>The Curriculum Development Committee resolved that any feedback on the new undergraduate model be sent to <a href="mailto:Ramesh.Sankaranarayana@anu.edu.au">Ramesh.Sankaranarayana@anu.edu.au</a> as soon as possible</td>
<td>Committee members</td>
<td>As soon as possible</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>9</td>
<td>The Curriculum Development Committee resolved that Jochen Trumpf and Alistair Rendell discuss the proposal approval process</td>
<td>Jochen Trumpf and Alistair Rendell</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>10</td>
<td>The Curriculum Development Committee resolved that enrolment data (timeline series) should be obtained for all postgraduate specialisations</td>
<td>Ramesh Sankaranarayana</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>10</td>
<td>The Curriculum Development Committee resolved that a review would be undertaken of Postgraduate programs</td>
<td>Ramesh Sankaranarayana</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>11</td>
<td>The Curriculum Development Committee resolved that Elizabeth Nunrom would check with ASQO regarding the possibility of students taking 4000-level courses in their second or third years</td>
<td>Elizabeth Nunrom</td>
<td>Not set</td>
<td>Completed</td>
<td>ASQO have confirmed that students undertaking 4000-level course in 2nd or 3rd years is permissible</td>
</tr>
<tr>
<td>RSCS</td>
<td>1/2016</td>
<td>12</td>
<td>The Committee resolved that an internal review would be conducted of COMP1730/3610/8705</td>
<td>Ramesh Sankaranarayana</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>2/2016</td>
<td>6.1</td>
<td>Paul Melloy to provide accurate enrolment numbers for the R&amp;D program</td>
<td>Paul Melloy</td>
<td>Not set</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>2/2016</td>
<td>8</td>
<td>The Committee resolved that any further feedback on the CECS Internships Guidelines should be sent to <a href="mailto:Natalie.Young@anu.edu.au">Natalie.Young@anu.edu.au</a> by 31 March</td>
<td>Committee members</td>
<td>31-Mar</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>RSCS</td>
<td>2/2016</td>
<td>9</td>
<td>The Curriculum Development Committee resolved to note the discussion and convenors encouraged to implement methods to address Ghost Writing within the School</td>
<td>Committee members</td>
<td>18-Apr</td>
<td>Ongoing</td>
<td></td>
</tr>
</tbody>
</table>
Part 3 – Curriculum Proposals

Item 7 Research School of Computer Science

Purpose
To review curriculum proposals from the Research School of Computer Science submitted to the Committee for their endorsement

Recommendation
That the Committee review the below proposals and approve them for submission to the College Education Committee.

ACTION REQUIRED
For discussion ☐ For decision ☑ For information ☐ School response ☐

Background

Program/Plan Amendment

<table>
<thead>
<tr>
<th>Page</th>
<th>Code</th>
<th>Title and brief description of proposed amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>7706</td>
<td>Master of Computer Science</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Update of program requirements to reflect changes to two compulsory courses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Update of Admission Requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Update of Learning Outcomes</td>
</tr>
<tr>
<td>24</td>
<td>6706</td>
<td>Graduate Diploma of Computing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Update of Admission Requirements</td>
</tr>
<tr>
<td>34</td>
<td>3701</td>
<td>Bachelor of Information Technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>46</td>
<td>4716</td>
<td>Bachelor of Advanced Computing (Hons)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>58</td>
<td>4717</td>
<td>Bachelor of Advanced Computing (R&amp;D) (Hons)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>71</td>
<td>4708</td>
<td>Bachelor of Software Engineering (Hons)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changes as a result of the Undergraduate Review</td>
</tr>
</tbody>
</table>

New Subplan

<table>
<thead>
<tr>
<th>Page</th>
<th>Type</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>86</td>
<td>Major</td>
<td>Data Science</td>
</tr>
<tr>
<td></td>
<td>Minors</td>
<td>HCC (For discussion)</td>
</tr>
<tr>
<td>88</td>
<td>Specialisation</td>
<td>Intelligent Systems</td>
</tr>
<tr>
<td>90</td>
<td>Specialisation</td>
<td>Theoretical Computer Science</td>
</tr>
</tbody>
</table>

Subplan Amendment

<table>
<thead>
<tr>
<th>Page</th>
<th>Code</th>
<th>Title and brief description of proposed amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td>91</td>
<td>COMS-MAJ</td>
<td>Computer Systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>93</td>
<td>COMS-SPEC</td>
<td>Computer Systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changing into ‘Systems and Architecture Specialisation’</td>
</tr>
<tr>
<td>96</td>
<td>INFS-MAJ</td>
<td>Information Systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>94</td>
<td>SOFT-MAJ</td>
<td>Software Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Changes as a result of the Undergraduate Review</td>
</tr>
</tbody>
</table>
Subplan Disestablishment – For discussion

<table>
<thead>
<tr>
<th>Page</th>
<th>Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Computer Engineering</td>
</tr>
</tbody>
</table>

New Courses

<table>
<thead>
<tr>
<th>Page</th>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>COMP 24XX</td>
<td>Introduction to Data Management, Analysis and Security</td>
</tr>
<tr>
<td>101</td>
<td>COMP 37XX</td>
<td>Individual Research Project</td>
</tr>
<tr>
<td>102</td>
<td>COMP 87XX</td>
<td>Individual Computing Project</td>
</tr>
</tbody>
</table>

Course Amendments

<table>
<thead>
<tr>
<th>Page</th>
<th>Course Code</th>
<th>Title and brief description of proposed amendments</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>ANUC 1100</td>
<td>Introduction to Programming and Algorithms/(Advanced)</td>
</tr>
<tr>
<td></td>
<td>COMP 1100</td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td></td>
<td>COMP 1130</td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td></td>
<td>ANUC 1110</td>
<td>Introduction to Software Systems</td>
</tr>
<tr>
<td></td>
<td>COMP 1110</td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td></td>
<td>COMP 1140</td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td></td>
<td>COMP 6710</td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td></td>
<td>COMP 2100</td>
<td>Software Construction</td>
</tr>
<tr>
<td></td>
<td>COMP 6442</td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>110</td>
<td>COMP 2130</td>
<td>Software Analysis and Design</td>
</tr>
<tr>
<td></td>
<td>COMP 6311</td>
<td>Change of name to ‘Software Engineering’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>116</td>
<td>COMP 2300</td>
<td>Introduction to Computer Systems</td>
</tr>
<tr>
<td></td>
<td>COMP 6300</td>
<td>Change of name to ‘Computer Organisations and Program Execution’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>124</td>
<td>COMP 2310</td>
<td>Concurrent and Distributed Systems</td>
</tr>
<tr>
<td></td>
<td>COMP 6310</td>
<td>Change of name to ‘Systems, Networks and Concurrency’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
<tr>
<td>131</td>
<td>COMP 2600</td>
<td>Formal Methods in Software Engineering</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change of name and code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes as a result of the Undergraduate Review</td>
</tr>
</tbody>
</table>

Course Inactivation – For discussion

<table>
<thead>
<tr>
<th>Page</th>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COMP 1510</td>
<td>Introduction to Software Engineering</td>
</tr>
<tr>
<td></td>
<td>ENGN 8100</td>
<td>Java Programming</td>
</tr>
<tr>
<td></td>
<td>COMP 2140</td>
<td>Java Programming</td>
</tr>
<tr>
<td></td>
<td>COMP 2500</td>
<td>Software Construction for Software Engineers</td>
</tr>
<tr>
<td></td>
<td>COMP 3420</td>
<td>Advanced Databases and Data Mining</td>
</tr>
<tr>
<td></td>
<td>COMP 6700</td>
<td>Introductory Programming</td>
</tr>
</tbody>
</table>

Sponsor
Associate Director of Education, Research School of Computer Science

Appendices
Appendix 7A – RSCS Curriculum Proposal forms
Amendment to Academic Award
(Coursework)

How to use this form

If you intend to change any of the following details, please instead complete a New Academic Award
(Coursework) Expression of Interest / Proposal. Fields for these details are marked with ☑ throughout this
form. Changes in marked fields will not be approved or processed.

• Award name
• Augmentation name (Masters Degrees only)
• Australian Qualifications Framework qualification level and type
• Full-time duration in years
• Units required for completion

A significant change to mode of delivery (e.g. becoming 100% online or offshore) may require a Award
proposal. In such cases, please email policy.reg@anu.edu.au to discuss.

Expected turn-around times (after College Education Committee endorsement)

| Amendment requiring no revision or further information | Three months |
| Amendment requiring some revision or further information | Six months |
| Amendment requiring some revision or further information, and further consultation | Nine months |

Please note that turnaround times are for ANU accreditation. Changes to international fee places, mode of
delivery or work-based training requirements may affect CRICOS registration and require additional time.

To fill out this Microsoft Word Form, click underlined italicised grey text, e.g. 41T, then make a selection or
enter text.

To edit the program title and code in the document header, first double click in the header area. Once edited,
the header will be updated on all pages.

Long-answer text fields allow the use of standard formatting features, such as bullet points, and will span
pages if necessary.

If you would like to provide feedback on this form, please email policy.reg@anu.edu.au. Attachments with
comments and/or tracked changes are welcome.

Details

| Award name | Master of Computer Science ☑ |
| Masters Augmentation (where relevant) | 41T ☑ |
Amendment to Academic Award

Plan code 7706XMCOMP
Australian Qualifications Framework level and Award type Level 9 - Masters Degree (Coursework)
External accreditation body (if any) Australian Computer Society
Full-time duration in years 2
Units required for completion 96
Amendment effective from: 1 January 2017
(Note: all amendments effective 1 January)

Linked qualifications
• If this is a pathway or an exit Award, please name the linked Awards. For information on pathways and exit Awards, please see Policy: Academic Programs and Courses Accreditation

Double degrees
• Is this plan part of a double degree?
  □ Flexible Double Degree (Arts, Social Sciences, Sciences and Business 4 Year)
  □ Flexible Double Degree (Arts, Social Sciences, Sciences and Business 5 Year)
  □ Flexible Double Degree (Law, Engineering and Advanced Computing 6 Year)
  □ Flexible Double Degree (Law)
  □ Flexible Double Degree (Engineering and Advanced Computing)
  □ Vertical Double Degree
  □ Double Masters Degree

Governance

Responsible College ANU College of Engineering & Computer Science
Who is the convener of the Award? Lynette Johns-Boast

Does this Award have a dedicated governance committee or advisory board (other than College Education Committee)? If so, detail membership and frequency of meetings.

No

Have proposed changes been endorsed by the governance committee or advisory board?

Summary

Provide an executive summary of this proposal for University Education Committee and Academic Board (100 words or fewer).

Course code, name, description & learning outcome change for two compulsory courses there were an outcome of the . Update admission requirements to fix a variation to them that had somehow been entered. Add program learning outcomes.

2 | THE AUSTRALIAN NATIONAL UNIVERSITY
Consultation

Complete fields in this section only where consultation has been undertaken.

Academic consultation
- Includes ANU and external consultation about academic merit and strategic alignment, contribution to teaching, cross-College disciplines, and cross-College pathway degrees
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Administration
- Includes degree structures, nomenclature, AQF and legislative compliance, Commonwealth support, CRICOS eligibility
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Services
- Includes support for specific cohorts, international students under the age of 18
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of International Operations and Student Recruitment
- Includes admissions, student recruitment, international agreements, international experiences, University publications
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Information Technology Services
- Includes support for specific software and infrastructure needs
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with ANU Library
- Includes access to specific online and physical collections, specialist information literacy training
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Note that insufficient consultation may preclude or delay approval or implementation
Description and requirements

Complete fields in this section only if the current details are being changed.

Marketing and publication description

• This section is published on the ‘Programs and Courses’ website to an external audience and is used primarily for marketing.
• Describe the Award including any key features, its research led elements and any external accreditation of the plan (100 words of fewer).

Study requirements and Orders

• Provide requirements for the completion of this Award.
• New courses must be approved before being entered into requirements.
• For Vertical Double Degree undergraduate plans and Double Masters Degrees, provide full requirements for the double degree (i.e. both Awards).
• Orders will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean to then be made by the Deputy Vice-Chancellor (Academic) (see Undergraduate Awards Rules and Graduate Awards Rules).
• This section is published on the ‘Programs and Courses’ website to an external audience.

The Master of Computer Science requires the completion of 96 units, which must consist of:

18 units from completion of the following compulsory courses:

COMP6250 Professional Practice I
COMP8260 Professional Practice II
COMP6442 Software Construction

24 units from completion of one of the following specialisations:

Artificial Intelligence
Computational Foundations
Computer Systems
Information and Human Centred Computing
Software Engineering

12 units from completion of the COMP8715 Computing Project.
12 units from completion courses in the subject area COMP Computer Science.
12 units from completion of elective courses offered by ANU.

Learning outcomes

• Learning outcomes are high-level statements of the skills and knowledge which ANU certifies that all graduates of the Award possess.
• For Vertical Double Degrees and Double Masters Degrees, provide full learning outcomes for both degrees.
• This section is published on the ‘Programs and Courses’ website to an external audience.

Upon successful completion, students will be able to:

Comment [LJ1]: I assume that even though we’re only changing two courses we need to state the whole thing again, so I have – the two changes are PPI and PPII.
Amendment to Academic Award

- Professionally apply systematic computing approaches to address complex, multi-disciplinary real-world computing problems in a variety of domains.
- Synthesise and proficiently apply advanced, integrated technical knowledge from their specialisation and other elective areas of study and the underpinning sciences and computational methods.
- Identify and critically evaluate current developments and emerging trends within their specialization and other elective areas of study.
- Understand the contextual factors that influence professional computing practice, and identify the potential societal, ethical, and environmental impact of engineering activities.
- Communicate effectively with colleagues, other engineering professionals and the broader community employing a range of communication media and tools.
- Engage in independent investigation, critical reflection and lifelong learning to continue to practice at the forefront of the discipline.
- Work effectively and proactively within cross-cultural, multi-disciplinary teams, demonstrating autonomy, ethical conduct, expert judgement, adaptability and responsibility to achieve computing outcomes at a high standard.

Admission requirements

Undergraduate
- ATAR, QLD Band and International Baccalaureate score.
- Include any other requirements, such as current 'Working with Vulnerable People' check, successful medical check, etc.
- Include secondary schooling prerequisites
- This section is published on the ‘Programs and Courses’ website to an external audience.

Honours plans (without specialisations)
- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete numbered items if not required. Note: Item 1 is not required if the degree name is specified.
- Choose only one option from a, b or c.
- A maximum of 12 courses may be specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:
1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in cognate disciplines, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. with at least:
   a. ______ courses in the subject area _____ [with at least ______ 3000-level courses or equivalent].
   b. a [major][minor][specialisation] or equivalent in _____.
   c. with the following courses or equivalent:
4. with the written approval of an identified supervisor for the research project
   with the written approval of an identified supervisor for the thesis

Comment [LJ 2]: Same as MENG
Amendment to Academic Award

Honours plans (with specialisations)
• Complete the template below only if the admission requirements are being amended
• Delete text in brackets if not required.
• Delete Item 1 if the degree name is specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:
1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in the discipline cognate to the honours specialisation, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. and the satisfaction of any further requirements specified in the relevant honours specialisation.

Direct-entry Graduate Coursework
• Complete the template below only if the admission requirements are being amended
• Final admission requirements will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean.
• This section is published on the ‘Programs and Courses’ website to an external audience.

A Bachelor degree or international equivalent with an average mark of at least 65% and with at least three courses (units of study) in the fields of computing and/or maths.

A bachelor degree in computing, science, engineering or related discipline with an average mark of at least 65% (or equivalent) and with at least one intermediate-level programming course and two mathematics courses in the areas of discrete mathematics, calculus, linear algebra and statistics.

All applicants must meet the University’s English Language Admission Requirements for Students.

Applicants with a Bachelor Degree or Graduate Certificate in a cognate discipline may be eligible for up to a maximum of 24 units (one semester) of credit.

Applicants with a Graduate Diploma or Honours in a cognate discipline may be eligible for up to a maximum of 48 units (one year) of credit.

Cognate disciplines (Honours and Graduate coursework only)
• List each discipline considered to be ‘cognate’ for the purposes of admission and credit on a new line.
• This section is published on the ‘Programs and Courses’ website to an external audience.

41T

Delivery

Current delivery mode(s):

New delivery mode(s) if changing:

☐ Will now include compulsory work-based training of 41T hours per week for 41T weeks.
☐ No longer includes compulsory work-based training

Comment [LJ 3]: Do we really mean to say that a student with, say a BA or an LLB who has 3 math courses can enroll?

Admission for GDip is “Admission requires an approved bachelor degree in a science, engineering or related discipline with a credit average (or equivalent) and with at least one programming course and two mathematics courses in the areas of discrete mathematics, calculus, linear algebra and statistics.”

I suggest this needs to be changed – have had a go with the following paragraph, which is essentially the Grad Dip requirements!
Amendment to Academic Award

☐ Will now be off campus – this Award is now to be administered and completed externally to the Acton campus.

☐ No longer off campus – this Award is now to be administered and completed at the Acton campus.

☐ Will now be Intensive – this Award is now to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.

Intensive duration in weeks (from commencement to submission of final assessment): \textit{41T}

☐ No longer intensive – this Award is no longer to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.

☐ Will now be registered on CRICOS (subject to assessment by TEQSA).

☐ No longer to be registered on CRICOS.

List all teaching periods in which students may commence study.

- i.e. Summer, First Semester, Autumn, Winter, Second Semester and/or Spring
- Note that international student visa holders must be able to complete within the normal duration of study without the need to ‘underload’ or take leave.

\textit{41T}

☐ International student visa holders are able to complete within the normal duration of study without the need to ‘underload’ or take leave when commencing in all listed teaching periods.

ANU Graduate Coursework model (Graduate Coursework only)

☐ This Award is consistent with the University’s Graduate Coursework Model

☐ This Award requires approval as an exception to the ANU Graduate Coursework model.

- For low-enrolment Graduate Certificates and Graduate Diplomas, provide a strategic case for retention of this Award and attach all available evidence.
- For Masters Degrees requiring more or less than 96 units, or with admission requirements other than a non-cognate Bachelor Degree, provide significant justification for creation of this Award (e.g. professional accreditation or international standards) and attach all available evidence.

\textit{41T}

Assessment alignment (Bachelor Honours Degrees only)

- If the learning outcomes are being amended, provide an explanation of how the structure of assessment determines whether the Honours learning outcomes have been met.

\textit{41T}

Timing of Honours assessment (Bachelor Honours Degrees only)

- \textit{If the Study requirements and Orders are being amended, provide an explanation of how either: a minimum of 25\% of the assessment which contributes to the final honours grade or; 15\% of the assessment which contributes to the final Honours mark and formalised monitoring of progress by staff other than each student’s supervisor or Honours convener is completed in the first half (in terms of duration) of Honours study.}

\textit{41T}
Honours research training availability (Bachelor Honours Degrees only)

- If the Study requirements and Orders or the teaching periods in which students may commence study are being amended, and Honours research training courses are to be available to students only once per calendar year, describe the strategies to be used to ensure that students who commence Honours in the Period in which these courses are not taught will not be disadvantaged.

Research component (Masters Degrees only)

- Provide an explanation of and list of courses for how the AQF Level 9 Masters Degree (Coursework) requirement that graduates must be able to “plan and execute a substantial research-based project, capstone experience and/or piece of scholarship” is demonstrated.

Typical full-time pattern of study

*Complete fields in this section only if the current details are being changed.*

Provide typical full-time patterns of study for each teaching period in which students may commence study.

- Each study pattern should demonstrate completion of the Orders given above in the full-time duration.
- Give the course type, level and unit value in each cell (see Examples below).
- Cells should be merged for courses of 12 or more units.
- Copy and paste rows as needed

<table>
<thead>
<tr>
<th>Students commencing in Semester 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
</tr>
<tr>
<td>COMP6442 Software Construction 6 units</td>
</tr>
<tr>
<td>COMP6250 Professional Practice I 6 units</td>
</tr>
<tr>
<td>Computing Specialisation Course 6 units</td>
</tr>
<tr>
<td>COMP6340 Networked Information Systems 6 units</td>
</tr>
<tr>
<td>COMP8260 Professional Practice II 6 units</td>
</tr>
<tr>
<td>Computing Specialisation Course 6 units</td>
</tr>
<tr>
<td>COMP6340 Relational Databases 6 units</td>
</tr>
<tr>
<td>COMP6311 Software Analysis &amp; Design 6 units</td>
</tr>
<tr>
<td>Year 2</td>
</tr>
<tr>
<td>COMP8715 Computing Project</td>
</tr>
<tr>
<td>Computing Specialisation</td>
</tr>
<tr>
<td>Computing Elective Course</td>
</tr>
<tr>
<td>Computing Elective Course</td>
</tr>
</tbody>
</table>

Comment [ LJ4]: I have put a plan in that shows the compulsory courses, 4 specialisation courses (whatever they are) and the ACS professional computing. Because of that I’ve shown the project in group mode. There are so many options that could have been entered here this seemed the most obvious as most the international students want the ACS accreditation pathway.
## Amendment to Academic Award

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP8715</td>
<td>Computing Project (Group mode)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Computing Specialisation</td>
<td>6</td>
</tr>
<tr>
<td>COMP8110</td>
<td>Managing Software Projects</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>University Elective</td>
<td>6</td>
</tr>
<tr>
<td>COMP6250</td>
<td>Professional Practice I</td>
<td>6</td>
</tr>
<tr>
<td>COMP6240</td>
<td>Relational Databases</td>
<td>6</td>
</tr>
<tr>
<td>COMP6311</td>
<td>Software Analysis &amp; Design</td>
<td>6</td>
</tr>
<tr>
<td>COMP6442</td>
<td>Software Construction</td>
<td>6</td>
</tr>
<tr>
<td>COMP6260</td>
<td>Professional Practice II</td>
<td>6</td>
</tr>
<tr>
<td>COMP6340</td>
<td>Networked Information Systems</td>
<td>6</td>
</tr>
<tr>
<td>COMP8715</td>
<td>Computing Project (Group mode)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Computing Specialisation</td>
<td>6</td>
</tr>
<tr>
<td>COMP8110</td>
<td>Managing Software Projects</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Computing Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>University Elective</td>
<td>6</td>
</tr>
</tbody>
</table>

**Students commencing in Semester 2**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COMP6250</td>
<td>Professional Practice I</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6240</td>
<td>Relational Databases</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6311</td>
<td>Software Analysis &amp; Design</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6442</td>
<td>Software Construction</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6260</td>
<td>Professional Practice II</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6340</td>
<td>Networked Information Systems</td>
<td>6</td>
</tr>
<tr>
<td>Year 2</td>
<td>COMP8715</td>
<td>Computing Project (Group mode)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Computing Specialisation</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMP8110</td>
<td>Managing Software Projects</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Computing Elective</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

### Fees

**Current fee places:**

**New fee places if changing:**

- For Awards adding International Student Fee places, identify an existing Award with the same indicative international student fee (see the annual fee schedule).

**Provide details of additional costs, such as compulsory fieldwork expenses (excludes SA Fee).**

**Division of Student Administration use only**

- Consistent with Australian Qualifications Framework, including Level 9 research component where relevant

---

9 | THE AUSTRALIAN NATIONAL UNIVERSITY
### Amendment to Academic Award

<table>
<thead>
<tr>
<th>Consistent with National Code 2007</th>
<th>If not consistent, give details:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistent with policy: Academic Programs and Courses Accreditation</td>
<td>If not consistent, give details:</td>
</tr>
<tr>
<td>Consistent with policy: Nomenclature</td>
<td>If not consistent, give details:</td>
</tr>
<tr>
<td>Consistent with policy: Structure and Wording of Coursework Award Requirements, including Registrar approval</td>
<td>If not consistent, give details:</td>
</tr>
<tr>
<td>Consistent with other relevant University policies and standards (e.g. Admission requirements template)</td>
<td>If not consistent, give details:</td>
</tr>
</tbody>
</table>

Is this **becoming** the default plan within a single degree program?

| Australian Higher Education Graduate Statement is appropriate and accurate | If not appropriate/accurate, provide new AHEGS below (copy and paste for multiple plans as necessary). |

**Detail of Plan - Australian Higher Education Graduation Statement (AHEGS)**

- **U**

**Plan Features - Australian Higher Education Graduation Statement (AHEGS)**

- **U**

**Plan Pathway - Australian Higher Education Graduation Statement (AHEGS)**

- **U**

**Plan Accreditation - Australian Higher Education Graduation Statement (AHEGS)**

- **U**

---

**College Education Committee**

Date reviewed by College Education Committee (CEC) | 41T
---

CEC recommendation to UEC

- Endorse with no conditions
- Endorse with conditions (specified below)
- Do not endorse

  41T

As approved by the Dean or delegated authority

41T on 41T
## University Education Committee

<table>
<thead>
<tr>
<th>Date reviewed by University Education Committee (UEC)</th>
<th>41T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Number</td>
<td>41T</td>
</tr>
<tr>
<td>UEC recommendation to Academic Board</td>
<td></td>
</tr>
<tr>
<td>☐ Accredit with no conditions</td>
<td></td>
</tr>
<tr>
<td>☐ Accredit with conditions (specified below)</td>
<td></td>
</tr>
<tr>
<td>☐ Do not accredit</td>
<td></td>
</tr>
</tbody>
</table>

## Academic Board

<table>
<thead>
<tr>
<th>Date considered by Academic Board</th>
<th>41T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Number</td>
<td>41T</td>
</tr>
<tr>
<td>Academic Board</td>
<td></td>
</tr>
<tr>
<td>☐ Accredits with no conditions from 41T</td>
<td></td>
</tr>
<tr>
<td>☐ Accredits with conditions (specified below) from 41T</td>
<td></td>
</tr>
<tr>
<td>☐ Does not accredit</td>
<td></td>
</tr>
</tbody>
</table>
## Amendment to Academic Award (Coursework)

### How to use this form

If you intend to change any of the following details, please instead complete a New Academic Award (Coursework) Expression of Interest / Proposal. Fields for these details are marked with ☉ throughout this form. Changes in marked fields will not be approved or processed.

- Award name
- Augmentation name (Masters Degrees only)
- Australian Qualifications Framework qualification level and type
- Full-time duration in years
- Units required for completion

A significant change to mode of delivery (e.g. becoming 100% online or offshore) may require a Award proposal. In such cases, please email policy.regs@anu.edu.au to discuss.

### Expected turn-around times (after College Education Committee endorsement)

<table>
<thead>
<tr>
<th>Amendment</th>
<th>Turn-around Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>requiring no revision or further information</td>
<td>Three months</td>
</tr>
<tr>
<td>requiring some revision or further information</td>
<td>Six months</td>
</tr>
<tr>
<td>requiring some revision or further information, and further consultation</td>
<td>Nine months</td>
</tr>
</tbody>
</table>

Please note that turnaroud times are for ANU accreditation. Changes to international fee places, mode of delivery or work-based training requirements may affect CRICOS registration and require additional time.

To fill out this Microsoft Word Form, click underlined italicised grey text, e.g. 41T, then make a selection or enter text.

To edit the program title and code in the document header, first double click in the header area. Once edited, the header will be updated on all pages.

Long-answer text fields allow the use of standard formatting features, such as bullet points, and will span pages if necessary.

If you would like to provide feedback on this form, please email policy.regs@anu.edu.au. Attachments with comments and/or tracked changes are welcome.

### Details

| Award name | Grad Dip of Computing ☉ |
| Masters Augmentation (where relevant) | 41T ☉ |
Amendment to Academic Award

Plan code 6706XGDCP

Australian Qualifications Framework level and Award type Level 8 - Graduate Diploma

External accreditation body (if any) Australian Computer Society

Full-time duration in years 1

Units required for completion 48

Amendment effective from: 1 January 2017

Linked qualifications
- If this is a pathway or an exit Award, please name the linked Awards. For information on pathways and exit Awards, please see Policy: Academic Programs and Courses Accreditation

Double degrees
- Is this plan part of a double degree?
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 4 Year)
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 5 Year)
  - Flexible Double Degree (Law, Engineering and Advanced Computing 6 Year)
  - Flexible Double Degree (Law)
  - Flexible Double Degree (Engineering and Advanced Computing)
  - Vertical Double Degree
  - Double Masters Degree

Governance

Responsible College ANU College of Engineering & Computer Science

Who is the convener of the Award? Lynette Johns-Boast

Does this Award have a dedicated governance committee or advisory board (other than College Education Committee)? If so, detail membership and frequency of meetings.

No

Have proposed changes been endorsed by the governance committee or advisory board?

No

Summary

Provide an executive summary of this proposal for University Education Committee and Academic Board (100 words or fewer).

At some point in the history of this program the entry requirements have been updated inappropriately. This change corrects them.
Amendment to Academic Award

Consultation

*Complete fields in this section only where consultation has been undertaken.*

Academic consultation
- Includes ANU and external consultation about academic merit and strategic alignment, contribution to teaching, cross-College disciplines, and cross-College pathway degrees
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Administration
- Includes degree structures, nomenclature, AQF and legislative compliance, Commonwealth support, CRICOS eligibility
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Services
- Includes support for specific cohorts, international students under the age of 18
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of International Operations and Student Recruitment
- Includes admissions, student recruitment, international agreements, international experiences, University publications
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Information Technology Services
- Includes support for specific software and infrastructure needs
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with ANU Library
- Includes access to specific online and physical collections, specialist information literacy training
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Note that insufficient consultation may preclude or delay approval or implementation

Description and requirements
Amendment to Academic Award

Complete fields in this section only if the current details are being changed.

Marketing and publication description
- This section is published on the ‘Programs and Courses’ website to an external audience and is used primarily for marketing.
- Describe the Award including any key features, its research led elements and any external accreditation of the plan (100 words of fewer).

Study requirements and Orders
- Provide requirements for the completion of this Award.
- New courses must be approved before being entered into requirements.
- For Vertical Double Degree undergraduate plans and Double Masters Degrees, provide full requirements for the double degree (i.e. both Awards).
- Orders will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean to then be made by the Deputy Vice-Chancellor (Academic) (see Undergraduate Awards Rules and Graduate Awards Rules).
- This section is published on the ‘Programs and Courses’ website to an external audience.

Learning outcomes
- Learning outcomes are high-level statements of the skills and knowledge which ANU certifies that all graduates of the Award possess.
- For Vertical Double Degrees and Double Masters Degrees, provide full learning outcomes for both degrees.
- This section is published on the ‘Programs and Courses’ website to an external audience.

Upon successful completion, students will be able to:

- 41T

Admission requirements

Undergraduate
- ATAR, QLD Band and International Baccalaureate score.
- Include any other requirements, such as current ‘Working with Vulnerable People’ check, successful medical check, etc.
- Include secondary schooling prerequisites
- This section is published on the ‘Programs and Courses’ website to an external audience.

Honours plans (without specialisations)
- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
Delete numbered items if not required. Note: Item 1 is not required if the degree name is specified.
Choose only one option from a, b or c.
A maximum of 12 courses may be specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:
1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in cognate disciplines, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. with at least:
   a. courses in the subject area [with at least 3000-level courses or equivalent]
   b. a major/minor/specialisation or equivalent in ______.
   c. with the following courses or equivalent:
4. with the written approval of an identified supervisor for the research project
   with the written approval of an identified supervisor for the thesis

Honours plans (with specialisations)
Complete the template below only if the admission requirements are being amended
Delete text in brackets if not required.
Delete Item 1 if the degree name is specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:
1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in the discipline cognate to the honours specialisation, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. and the satisfaction of any further requirements specified in the relevant honours specialisation.

Direct-entry Graduate Coursework
Complete the template below only if the admission requirements are being amended
Final admission requirements will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean.
This section is published on the ‘Programs and Courses’ website to an external audience.

A Bachelor degree or international equivalent, ideally with one mathematics course in the areas of discrete mathematics, calculus, linear algebra and statistics.

Students without a degree but who have at least three years relevant work experience, or a combination of qualifications and experience, may also receive admission.

All students who have completed the Graduate Diploma in Computing are eligible for associate membership with the Australian Computer Society. Students completing the Graduate Diploma in Computing with a Distinction average may be granted up to one year of status to the Master of Computing.

All applicants must meet the University’s English Language Admission Requirements for Students

Cognate disciplines (Honours and Graduate coursework only)
Amendment to Academic Award

- List each discipline considered to be ‘cognate’ for the purposes of admission and credit on a new line.
- This section is published on the ‘Programs and Courses’ website to an external audience.

41T

Delivery

Current delivery mode(s):

New delivery mode(s) if changing:

☐ Will now include compulsory work-based training of 41T hours per week for 41T weeks.

☐ No longer includes compulsory work-based training

☐ Will now be off campus – this Award is now to be administered and completed externally to the Acton campus.

☐ No longer off campus – this Award is now to be administered and completed at the Acton campus.

☐ Will now be Intensive – this Award is now to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.

Intensive duration in weeks (from commencement to submission of final assessment): 41T

☐ No longer intensive – this Award is no longer to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.

☐ Will now be registered on CRICOS (subject to assessment by TEQSA).

☐ No longer to be registered on CRICOS.

List all teaching periods in which students may commence study.

- i.e. Summer, First Semester, Autumn, Winter, Second Semester and/or Spring
- Note that international student visa holders must be able to complete within the normal duration of study without the need to ‘underload’ or take leave.

41T

☐ International student visa holders are able to complete within the normal duration of study without the need to ‘underload’ or take leave when commencing in all listed teaching periods.

ANU Graduate Coursework model (Graduate Coursework only)

☐ This Award is consistent with the University’s Graduate Coursework Model

☐ This Award requires approval as an exception to the ANU Graduate Coursework model.

- For low-enrolment Graduate Certificates and Graduate Diplomas, provide a strategic case for retention of this Award and attach all available evidence.

- For Masters Degrees requiring more or less than 96 units, or with admission requirements other than a non-cognate Bachelor Degree, provide significant justification for creation of this Award (e.g. professional accreditation or international standards) and attach all available evidence.

41T

6 | THE AUSTRALIAN NATIONAL UNIVERSITY
Amendment to Academic Award

Assessment alignment (Bachelor Honours Degrees only)

- If the learning outcomes are being amended, provide an explanation of how the structure of assessment determines whether the Honours learning outcomes have been met.

41T

Timing of Honours assessment (Bachelor Honours Degrees only)

- If the Study requirements and Orders are being amended, provide an explanation of how either: a minimum of 25% of the assessment which contributes to the final honours grade or; 15% of the assessment which contributes to the final Honours mark and formalised monitoring of progress by staff other than each student’s supervisor or Honours convener is completed in the first half (in terms of duration) of Honours study.

41T

Honours research training availability (Bachelor Honours Degrees only)

- If the Study requirements and Orders or the teaching periods in which students may commence study are being amended, and Honours research training courses are to be available to students only once per calendar year, describe the strategies to be used to ensure that students who commence Honours in the Period in which these courses are not taught will not be disadvantaged.

41T

Research component (Masters Degrees only)

- Provide an explanation of and list of courses for how the AQF Level 9 Masters Degree (Coursework) requirement that graduates must be able to “plan and execute a substantial research-based project, capstone experience and/or piece of scholarship” is demonstrated.

41T

Typical full-time pattern of study

Complete fields in this section only if the current details are being changed.

Provide typical full-time patterns of study f for each teaching period in which students may commence study.

- Each study pattern should demonstrate completion of the Orders given above in the full-time duration.
- Give the course type, level and unit value in each cell (see Examples below).
- Cells should be merged for courses of 12 or more units.
- Copy and paste rows as needed

For students planning to transfer to the Master of Computing on completion of the Graduate Diploma, in addition to the core courses it is recommended that they take COMP6250 as one of their elective courses.
### Amendment to Academic Award

#### Students commencing in Semester 1

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COMP6340</td>
<td>Networked Information Systems</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6700</td>
<td>Introductory Programming</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMPXXXX</td>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6311</td>
<td>Software Analysis &amp; Design</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6240</td>
<td>Relational Databases</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6730</td>
<td>Programming for Scientists</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMPXXXX</td>
<td>Elective</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Students commencing in Semester 2

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COMP6710</td>
<td>Introduction to Software Systems</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6311</td>
<td>Software Analysis &amp; Design</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6240</td>
<td>Relational Databases</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMPXXXX</td>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6442</td>
<td>Software Construction</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP6340</td>
<td>Networked Information Systems</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>ENGN6537</td>
<td>Discrete Time Signal Processing</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>ENGN8538</td>
<td>Probability and Stochastic Processes</td>
<td>6</td>
</tr>
</tbody>
</table>

### Fees

#### Current fee places:

#### New fee places if changing:

- For Awards adding International Student Fee places, identify an existing Award with the same indicative international student fee (see the annual fee schedule).

41T

- Provide details of additional costs, such as compulsory fieldwork expenses (excludes SA Fee).

41T

### Division of Student Administration use only

- Consistent with Australian Qualifications Framework, including Level 9 research component where relevant
- If not consistent, give details:
  41T

- Consistent with National Code 2007
- If not consistent, give details:
  41T
Amendment to Academic Award

☐ Consistent with policy: Academic Programs and Courses Accreditation
If not consistent, give details:
41T

☐ Consistent with policy: Nomenclature
If not consistent, give details:
41T

☐ Consistent with policy: Structure and Wording of Coursework Award Requirements, including Registrar approval
If not consistent, give details:
41T

☐ Consistent with other relevant University policies and standards (e.g. Admission requirements template)
If not consistent, give details:
41T

Is this becoming the default plan within a single degree program?

☐ Australian Higher Education Graduate Statement is appropriate and accurate
If not appropriate/accurate, provide new AHEGS below (copy and paste for multiple plans as necessary).

Detail of Plan - Australian Higher Education Graduation Statement (AHEGS)

U

Plan Features - Australian Higher Education Graduation Statement (AHEGS)

U

Plan Pathway - Australian Higher Education Graduation Statement (AHEGS)

U

Plan Accreditation - Australian Higher Education Graduation Statement (AHEGS)

U

College Education Committee

Date reviewed by College Education Committee (CEC) 41T
CEC recommendation to UEC
☐ Endorse with no conditions
☐ Endorse with conditions (specified below)
☐ Do not endorse

41T

As approved by the Dean or delegated authority
41T on 41T

University Education Committee
Amendment to Academic Award

Date reviewed by University Education Committee (UEC) 41T
Document Number 41T

UEC recommendation to Academic Board
- Accredit with no conditions
- Accredit with conditions (specified below)
- Do not accredit

Academic Board

Date considered by Academic Board 41T
Document Number 41T

Academic Board
- Accredits with no conditions from 41T
- Accredits with conditions (specified below) from 41T
- Does not accredit

41T
**Amendment to Academic Award (Coursework)**

---

**How to use this form**

If you intend to change any of the following details, please instead complete a New Academic Award (Coursework) Expression of Interest / Proposal. Fields for these details are marked with ☺ throughout this form. Changes in marked fields will not be approved or processed.

- Award name
- Augmentation name (Masters Degrees only)
- Australian Qualifications Framework qualification level and type
- Full-time duration in years
- Units required for completion

A significant change to mode of delivery (e.g. becoming 100% online or offshore) may require a Award proposal. In such cases, please email policy.regs@anu.edu.au to discuss.

**Expected turn-around times (after College Education Committee endorsement)**

| Amendment requiring no revision or further information | Three months |
| Amendment requiring some revision or further information | Six months |
| Amendment requiring some revision or further information, and further consultation | Nine months |

Please note that turnaround times are for ANU accreditation. Changes to international fee places, mode of delivery or work-based training requirements may affect CRICOS registration and require additional time.

To fill out this Microsoft Word Form, click underlined italicised grey text, e.g. 41T, then make a selection or enter text.

To edit the program title and code in the document header, first double click in the header area. Once edited, the header will be updated on all pages.

Long-answer text fields allow the use of standard formatting features, such as bullet points, and will span pages if necessary.

If you would like to provide feedback on this form, please email policy.regs@anu.edu.au. Attachments with comments and/or tracked changes are welcome.

---

**Details**

- **Award name**: Bachelor of Information Technology
- **Masters Augmentation (where relevant)**: 41T
Plan code 3701XBİNFTEX

Australian Qualifications Framework level and Award type Level 7 - Bachelor Degree

External accreditation body (if any) Australian Computer Society

Full-time duration in years 3

Units required for completion 144

Amendment effective from: 1 January 2017
(Note: all amendments effective 1 January)

Linked qualifications

- If this is a pathway or an exit Award, please name the linked Awards. For information on pathways and exit Awards, please see Policy: Academic Programs and Courses Accreditation

41T

Double degrees

- Is this plan part of a double degree?
  - [ ] Flexible Double Degree (Arts, Social Sciences, Sciences and Business 4 Year)
  - [ ] Flexible Double Degree (Arts, Social Sciences, Sciences and Business 5 Year)
  - [ ] Flexible Double Degree (Law, Engineering and Advanced Computing 6 Year)
  - [ ] Flexible Double Degree (Law)
  - [ ] Flexible Double Degree (Engineering and Advanced Computing)
  - [ ] Vertical Double Degree
  - [ ] Double Masters Degree

Governance

Responsible College ANU College of Engineering & Computer Science

Who is the convener of the Award? Professor Tom Gedeon

Does this Award have a dedicated governance committee or advisory board (other than College Education Committee)? If so, detail membership and frequency of meetings.

The Research School of Computer Science operates a Curriculum Development Committee. The membership consists of the Head of School, Associate Director Education (Chair), Associate Director (Education) from Engineering, the Convenors of each of the programs offered by the School (the BIT, BAC, BSEng, Honours and the MComp), three other academics from the School, the Manager (Student Services) or representative and a representative from the Information Systems group, CBE. The CDC meets at least twice per semester.

There is also an Industry Advisory Board that meets twice a year and provides input into the programs run by the School, amongst other things.

Have proposed changes been endorsed by the governance committee or advisory board?

Summary
Provide an executive summary of this proposal for University Education Committee and Academic Board (100 words or fewer).

Over some period of time, there has been a discussion within the Research School of Computer Science (RSCS) concerning the nature and content of the undergraduate education programs, including the Bachelor of Information Technology. Most recently, this led to the creation of a working group charged with reviewing prior discussions and determining a way forward.

The working group consulted with a number of groups, including industry, students, and ANU academic stakeholders outside of RSCS. In addition CECS commissioned an external company – the Knowledge Partnership – to undertake some market research on our programs and related programs.

Based on the input from the above consultations, the purpose and graduate attributes of the three program offerings of the School, namely, the Bachelor of Information Technology, the Bachelor of Software Engineering (Honours) and the Bachelor of Advanced Computing (Honours), were reviewed and refined, with a view to the future. Considerable effort was devoted to better characterising these programs.

The core of the revised BIT is normally undertaken in the first two years and forms a subset of the cores of the four year programs. This allows for easy transition across the programs (except for the R&D program) in the first two years of study.

The revised BIT has a focus on the practice of computing and its purpose is to provide the skills and capabilities for the professional practice of computing across a range of domains. Through this program students develop an appreciation that computing interacts with many different domains and that solutions to many problems require both computing skills and domain knowledge, as well as the ability to communicate with, and learn from, experts from different domains and an ability to solve real world problems using computing in a range of domains.

Consultation

Complete fields in this section only where consultation has been undertaken.

Academic consultation

- Includes ANU and external consultation about academic merit and strategic alignment, contribution to teaching, cross-College disciplines, and cross-College pathway degrees
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consulted with Lilia Ferraro and Steve Roberts, MSI; Brownwen Whiting, CBE and Royston Gustavson, CASS;

Consultation with Division of Student Administration

- Includes degree structures, nomenclature, AQF and legislative compliance, Commonwealth support, CRICOS eligibility
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Services

- Includes support for specific cohorts, international students under the age of 18
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.
Consultation with Division of International Operations and Student Recruitment

• Includes admissions, student recruitment, international agreements, international experiences, University publications
• Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Information Technology Services

• Includes support for specific software and infrastructure needs
• Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with ANU Library

• Includes access to specific online and physical collections, specialist information literacy training
• Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Note that insufficient consultation may preclude or delay approval or implementation

Description and requirements

Complete fields in this section only if the current details are being changed.

Marketing and publication description

• This section is published on the ‘Programs and Courses’ website to an external audience and is used primarily for marketing.
• Describe the Award including any key features, its research led elements and any external accreditation of the plan (100 words of fewer).

This is what is currently on P&C. Does this need to change?

Look around, Information Technology (IT) is everywhere - your TV, laptop, gaming system, mobile phone, watch, music, movies, kitchen, car, bank and your next gig tickets. It is changing the way we live, learn, work and even socialise.

If you are interested in driving this exciting revolution, within a truly globalised and fast changing industry, then the ANU Bachelor of Information Technology is for you.

You will get a strong grounding in computing fundamentals to tackle the progressive nature of IT. With IT being an intrinsic part of all industries, knowledge of software development and information systems is highly sought after by the best employers.

This degree can also be taken as a flexible double with almost any other degree at ANU.

Study requirements and Orders

• Provide requirements for the completion of this Award.
• New courses must be approved before being entered into requirements.
• For Vertical Double Degree undergraduate plans and Double Masters Degrees, provide full requirements for the double degree (i.e. both Awards).
• Orders will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean to then be made by the Deputy Vice-Chancellor (Academic) (see Undergraduate Awards Rules and Graduate Awards Rules).
• This section is published on the ‘Programs and Courses’ website to an external audience.

The Bachelor of Information Technology requires completion of 144 units, of which:
• A maximum of 60 units may come from completion of 1000-level courses

The 144 units must include:

42 units from the completion of the following compulsory courses:

• COMP1100 Introduction to Programming and Algorithms or COMP1130 Introduction to Programming and Algorithms (Advanced)
• COMP1110 Introduction to Software Systems or COMP1140 Introduction to Software Systems (Advanced)
• COMP16xx Theoretical Foundations of Computer Science
• COMP2100 Software Construction
• COMP2300 Introduction to Computer Systems
• COMP24xx Introduction to Data Management, Analysis and Security
• MATH1005 Discrete Mathematical Models

A further 30 units from the completion of 3000/4000-level courses from the following subject areas:

• COMP Computer Science
• INFS Information Systems (only if completing the Information Systems major)

A further 24 units from completion of courses from the following:

• COMP Computer Science
• INFS Information Systems (only if completing the Information Systems major)
• One from:
  o MATH1013 Mathematics and Applications 1
  o MATH1014 Mathematics and Applications 2
  o MATH1115 Mathematics and Applications 1 (Honours)
  o MATH1116 Mathematics and Applications 2 (Honours)
  o MATH2310 Games, Graphs and Machines
• ENGN1211 Discovering Engineering
• VCUG3001 Unravelling Complexity

48 units from the completion of elective courses offered by the ANU

Learning outcomes
• Learning outcomes are high-level statements of the skills and knowledge which ANU certifies that all graduates of the Award possess.
• For Vertical Double Degrees and Double Masters Degrees, provide full learning outcomes for both degrees.
• This section is published on the ‘Programs and Courses’ website to an external audience.
On successful completion, students will be able to:

1. Analyse well defined problems, and design, implement and evaluate solutions that demonstrate an understanding of the systems context in which software is developed and operated including economic, social, historical, sustainability and ethical aspects.
2. Recognise connections and recurring themes, including abstraction and complexity, across the discipline.
3. Adapt to new environments and technologies, and to innovate.
4. Demonstrate an operational understanding of the foundations of computer science including programming, algorithms, logic, architectures and data structures.
5. Communicate complex concepts effectively with diverse audiences using a range of modalities.
6. Work effectively within a team in order to achieve a common goal.
7. Demonstrate commitment to professional conduct and development that recognises the social, legal and ethical implications of their work, to work independently, and self- and peer-assess performance.

Admission requirements

Undergraduate

- ATAR, QLD Band and International Baccalaureate score.
- Include any other requirements, such as current ‘Working with Vulnerable People’ check, successful medical check, etc.
- Include secondary schooling prerequisites
- This section is published on the ‘Programs and Courses’ website to an external audience.

Honours plans (without specialisations)

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete numbered items if not required. Note: Item 1 is not required if the degree name is specified.
- Choose only one option from a, b or c.
- A maximum of 12 courses may be specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:

1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in cognate disciplines, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. with at least:
   a. _____ courses in the subject area _____ [with at least _____ 3000-level courses or equivalent] .
   b. a [major][minor][specialisation] or equivalent in _____ .
   c. with the following courses or equivalent:
4. with the written approval of an identified supervisor for the research project
   with the written approval of an identified supervisor for the thesis

Honours plans (with specialisations)
Amendment to Academic Award

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete Item 1 if the degree name is specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:
1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in the discipline cognate to the honours specialisation, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. and the satisfaction of any further requirements specified in the relevant honours specialisation.

Direct-entry Graduate Coursework
- Complete the template below only if the admission requirements are being amended
- Final admission requirements will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean.
- This section is published on the ‘Programs and Courses’ website to an external audience.

A Bachelor degree or international equivalent
- with an average mark of at least 41T [Delete if not required]
- with at least 41T courses in the field of 41T [Delete if not required]
- with at least 41T years’ work experience in 41T [Delete if not required]
- with the approval of an identified supervisor for the research project/thesis. [Delete if not required]
- with a successful assessment of a portfolio of works. [Delete if not required]
- with a successful audition. [Delete if not required]
- with a 41T [Delete if not required]

Cognate disciplines (Honours and Graduate coursework only)
- List each discipline considered to be ‘cognate’ for the purposes of admission and credit on a new line.
- This section is published on the ‘Programs and Courses’ website to an external audience.

Delivery

Current delivery mode(s): In person - 75% or more on campus, maximum 25% of courses online

New delivery mode(s) if changing:

- Will now include compulsory work-based training of 41T hours per week for 41T weeks.
- No longer includes compulsory work-based training
- Will now be off campus – this Award is now to be administered and completed externally to the Acton campus.
- No longer off campus – this Award is now to be administered and completed at the Acton campus.
- Will now be Intensive – this Award is now to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.
  Intensive duration in weeks (from commencement to submission of final assessment): 41T
☐ No longer intensive – this Award is no longer to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.

☐ Will now be registered on CRICOS (subject to assessment by TEQSA).

☐ No longer to be registered on CRICOS.

List all teaching periods in which students may commence study.

- i.e. Summer, First Semester, Autumn, Winter, Second Semester and/or Spring
- Note that international student visa holders must be able to complete within the normal duration of study without the need to ‘underload’ or take leave.

Semester 1 or Semester 2

☐ International student visa holders are able to complete within the normal duration of study without the need to ‘underload’ or take leave when commencing in all listed teaching periods.

ANU Graduate Coursework model (Graduate Coursework only)

☐ This Award is consistent with the University’s Graduate Coursework Model

☐ This Award requires approval as an exception to the ANU Graduate Coursework model.

- For low-enrolment Graduate Certificates and Graduate Diplomas, provide a strategic case for retention of this Award and attach all available evidence.

- For Masters Degrees requiring more or less than 96 units, or with admission requirements other than a non-cognate Bachelor Degree, provide significant justification for creation of this Award (e.g. professional accreditation or international standards) and attach all available evidence.

41T

Assessment alignment (Bachelor Honours Degrees only)

- If the learning outcomes are being amended, provide an explanation of how the structure of assessment determines whether the Honours learning outcomes have been met.

41T

Timing of Honours assessment (Bachelor Honours Degrees only)

- If the Study requirements and Orders are being amended, provide an explanation of how either: a minimum of 25% of the assessment which contributes to the final honours grade or; 15% of the assessment which contributes to the final Honours mark and formalised monitoring of progress by staff other than each student’s supervisor or Honours convener is completed in the first half (in terms of duration) of Honours study.

41T

Honours research training availability (Bachelor Honours Degrees only)

- If the Study requirements and Orders or the teaching periods in which students may commence study are being amended, and Honours research training courses are to be available to students only once per calendar year, describe the strategies to be used to ensure that students who commence Honours in the Period in which these courses are not taught will not be disadvantaged.
Research component (Masters Degrees only)

- Provide an explanation of and list of courses for how the AQF Level 9 Masters Degree (Coursework) requirement that graduates must be able to “plan and execute a substantial research-based project, capstone experience and/or piece of scholarship” is demonstrated.

**Typical full-time pattern of study**

*Complete fields in this section only if the current details are being changed.*

Provide typical full-time patterns of study for each teaching period in which students may commence study.

- Each study pattern should demonstrate completion of the Orders given above in the full-time duration.
- Give the course type, level and unit value in each cell (see Examples below).
- Cells should be merged for courses of 12 or more units.
- Copy and paste rows as needed

**Examples:**

<table>
<thead>
<tr>
<th>Year X</th>
<th>COMP1234 6 units</th>
<th>Turkish Major 2000-level 6 units</th>
<th>Science Minor 2 1000-level 6 units</th>
<th>Elective 6 units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reading course 6000-level 6 units</td>
<td>Financial Institution Internship 18 units</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Semester 1 Entry**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>COMP1100/COMP1130 6 units</th>
<th>MATH1005 6 units</th>
<th>Elective 6 units</th>
<th>Elective 6 units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COMP1110/COMP1140 6 units</td>
<td>COMP16xx 6 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 2</td>
<td>COMP1110</td>
<td>COMP2300 6 units</td>
<td>COMP24xx 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 3</td>
<td>COMP Elective 6 units</td>
<td>COMP Elective 6 units</td>
<td>COMP Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td></td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>Elective 6 units</td>
</tr>
</tbody>
</table>
Semester 2 Entry

<table>
<thead>
<tr>
<th>Year 1</th>
<th></th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP1100/COMP1130 6 units</td>
<td>Elective 6 units</td>
<td>COMP1110/COMP1140 6 units</td>
<td>MATH1005 6 units</td>
<td>COMP2300 6 units</td>
</tr>
<tr>
<td>COMP16xx 6 units</td>
<td>COMP2100 6 units</td>
<td>COMP Elective 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
</tr>
<tr>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
</tr>
<tr>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td>COMP Elective 3000-level 6 units</td>
<td></td>
</tr>
</tbody>
</table>

Fees

Current fee places:
New fee places if changing:

- For Awards adding International Student Fee places, identify an existing Award with the same indicative international student fee (see the annual fee schedule).

| 41T |

- Provide details of additional costs, such as compulsory fieldwork expenses (excludes SA Fee).

| 41T |

Division of Student Administration use only

☐ Consistent with Australian Qualifications Framework, including Level 9 research component where relevant

If not consistent, give details:

| 41T |

☐ Consistent with National Code 2007

If not consistent, give details:

| 41T |
Consistent with policy: Academic Programs and Courses Accreditation
☐ If not consistent, give details: 41T

Consistent with policy: Nomenclature
☐ If not consistent, give details: 41T

Consistent with policy: Structure and Wording of Coursework Award Requirements, including Registrar approval
☐ If not consistent, give details: 41T

Consistent with other relevant University policies and standards (e.g. Admission requirements template)
☐ If not consistent, give details: 41T

Is this becoming the default plan within a single degree program?
☐ Australian Higher Education Graduate Statement is appropriate and accurate
☐ If not appropriate/accurate, provide new AHEGS below (copy and paste for multiple plans as necessary).

Detail of Plan - Australian Higher Education Graduation Statement (AHEGS)

Plan Features - Australian Higher Education Graduation Statement (AHEGS)

Plan Pathway - Australian Higher Education Graduation Statement (AHEGS)

Plan Accreditation - Australian Higher Education Graduation Statement (AHEGS)

College Education Committee

Date reviewed by College Education Committee (CEC): 41T
CEC recommendation to UEC: 41T
- Endorse with no conditions
- Endorse with conditions (specified below)
- Do not endorse

41T

As approved by the Dean or delegated authority on 41T

University Education Committee
### Date reviewed by University Education Committee (UEC)

<table>
<thead>
<tr>
<th>Document Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>41T</td>
</tr>
</tbody>
</table>

### UEC recommendation to Academic Board

- Accredit with no conditions
- Accredit with conditions (specified below)
- Do not accredit

### Academic Board

<table>
<thead>
<tr>
<th>Document Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>41T</td>
</tr>
</tbody>
</table>

### Academic Board recommendation to Academic Board

- Accredits with no conditions from 41T
- Accredits with conditions (specified below) from 41T
- Does not accredit
Amendment to Academic Award (Coursework)

How to use this form

If you intend to change any of the following details, please instead complete a New Academic Award (Coursework) Expression of Interest / Proposal. Fields for these details are marked with ☐ throughout this form. Changes in marked fields will not be approved or processed.

- Award name
- Augmentation name (Masters Degrees only)
- Australian Qualifications Framework qualification level and type
- Full-time duration in years
- Units required for completion

A significant change to mode of delivery (e.g. becoming 100% online or offshore) may require a Award proposal. In such cases, please email policy.regs@anu.edu.au to discuss.

Expected turn-around times (after College Education Committee endorsement)

| Amendment requiring no revision or further information | Three months |
| Amendment requiring some revision or further information | Six months |
| Amendment requiring some revision or further information, and further consultation | Nine months |

Please note that turnaround times are for ANU accreditation. Changes to international fee places, mode of delivery or work-based training requirements may affect CRICOS registration and require additional time.

To fill out this Microsoft Word Form, click underlined italicised grey text, e.g. Click here to enter a date, then make a selection or enter text.

To edit the program title and code in the document header, first double click in the header area. Once edited, the header will be updated on all pages.

Long-answer text fields allow the use of standard formatting features, such as bullet points, and will span pages if necessary.

If you would like to provide feedback on this form, please email policy.regs@anu.edu.au. Attachments with comments and/or tracked changes are welcome.

Details

Award name
Bachelor of Advanced Computing

Masters Augmentation (where relevant)
Plan code: AACOM

Australian Qualifications Framework level and Award type: Level 8 - Bachelor Honours Degree

External accreditation body (if any): Australian Computer Society

Full-time duration in years: 4

Units required for completion: 192

Amendment effective from: 1 January 2017 (Note: all amendments effective 1 January)

Linked qualifications:
- If this is a pathway or an exit Award, please name the linked Awards. For information on pathways and exit Awards, please see Policy: Academic Programs and Courses Accreditation

Double degrees:
- Is this plan part of a double degree?
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 4 Year)
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 5 Year)
  - Flexible Double Degree (Law, Engineering and Advanced Computing 6 Year)
  - Flexible Double Degree (Law)
  - Flexible Double Degree (Engineering and Advanced Computing)
  - Vertical Double Degree
  - Double Masters Degree

Governance:

Responsible College: ANU College of Engineering & Computer Science

Who is the convener of the Award? Dr Eric McCreath

Does this Award have a dedicated governance committee or advisory board (other than College Education Committee)? If so, detail membership and frequency of meetings.

The Research School of Computer Science operates a Curriculum Development Committee. The membership consists of the Head of School, Associate Director Education (Chair), Associate Director (Education) from Engineering, the Convenors of each of the programs offered by the School (the BIT, BAC, BSEng, Honours and the MComp), three other academics from the School, the Manager (Student Services) or representative and a representative from the Information Systems group, CBE. The CDC meets at least twice per semester.

There is also an Industry Advisory Board that meets twice a year and provides input into the programs run by the School, amongst other things.

Have proposed changes been endorsed by the governance committee or advisory board? Click to select an option
Summary

Provide an executive summary of this proposal for University Education Committee and Academic Board (100 words or fewer).

Over some period of time, there has been a discussion within the Research School of Computer Science (RSCS) concerning the nature and content of the undergraduate education programs, including the Bachelor of Advanced Computing. Most recently, this led to the creation of a working group charged with reviewing prior discussions and determining a way forward.

The working group consulted with a number of groups, including industry, students, and ANU academic stakeholders outside of RSCS. In addition CECS commissioned an external company – the Knowledge Partnership – to undertake some market research on our programs and related programs.

Based on the input from the above consultations, the purpose and graduate attributes of the three program offerings of the School, namely, the Bachelor of Information Technology, the Bachelor of Information Technology (Honours) and the Bachelor of Advanced Computing (Honours), were reviewed and refined, with a view to the future. Considerable effort was devoted to better characterising these programs.

A significant part of the core of the revised BAC is normally undertaken in the first two years and forms a superset of the core of the BIT and is almost identical to the first 2 year of the BSEng. This allows for easy transition across the programs in the first two years of study.

The revised BAC has a focus on the science of computing and its purpose is to provide skills and capabilities for professional practice, scientific innovation and research within the field of computing.

Consultation

Complete fields in this section only where consultation has been undertaken.

Academic consultation

- Includes ANU and external consultation about academic merit and strategic alignment, contribution to teaching, cross-College disciplines, and cross-College pathway degrees
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Administration

- Includes degree structures, nomenclature, AQF and legislative compliance, Commonwealth support, CRICOS eligibility
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Services

- Includes support for specific cohorts, international students under the age of 18
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.
Consultation with Division of International Operations and Student Recruitment
- Includes admissions, student recruitment, international agreements, international experiences, University publications
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Click here to enter text

Consultation with Information Technology Services
- Includes support for specific software and infrastructure needs
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Click here to enter text

Consultation with ANU Library
- Includes access to specific online and physical collections, specialist information literacy training
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Click here to enter text

Note that insufficient consultation may preclude or delay approval or implementation

Description and requirements

Complete fields in this section only if the current details are being changed.

Marketing and publication description
- This section is published on the 'Programs and Courses' website to an external audience and is used primarily for marketing.
- Describe the Award including any key features, its research led elements and any external accreditation of the plan (100 words of fewer).

If you want to find out what drives (and how to work for) companies like Google, Microsoft, Apple or Facebook, you are looking at the right degree.

This is a unique, interdisciplinary program that will prepare you to be a future leader of the information and communications technology revolution.

As a degree accredited by the Australian Computer Society you will not only learn advanced computing techniques and have the opportunity to complete a unique major, but also develop exceptional professional skills in areas of entrepreneurship and management.

While some of our students are developing code which controls unmanned aerial vehicles, others are busy writing algorithms to mine through Petabytes of data. If mastering challenging projects is your thing, the ANU Bachelor of Advanced Computing can launch you into a spectacular career.

Study requirements and Orders
- Provide requirements for the completion of this Award.
- New courses must be approved before being entered into requirements.
- For Vertical Double Degree undergraduate plans and Double Masters Degrees, provide full requirements for the double degree (i.e. both Awards).
Orders will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean to then be made by the Deputy Vice-Chancellor (Academic) (see Undergraduate Awards Rules and Graduate Awards Rules).

This section is published on the 'Programs and Courses' website to an external audience.

The Bachelor of Advanced Computing (Honours) requires completion of 192 units, of which:

- A maximum of 60 units may come from completion of 1000-level courses

The 192 units must include:

66 units from completion of compulsory courses from the following list:

- MATH1005 Discrete Mathematical Models
- COMP1100 Introduction to Programming and Algorithms or COMP1130 Introduction to Programming and Algorithms (Advanced)
- COMP1110 Introduction to Software Systems or COMP1140 Introduction to Software Systems (Advanced)
- COMP16xx Theoretical Foundations of Computer Science
- COMP24xx Introduction to Data Management, Analysis and Security
- COMP2100 Software Construction
- COMP2300 Introduction to Computer Systems
- COMP2310 Concurrent & Distributed Systems
- COMP2130 Software Analysis and Design
- COMP3600 Algorithms
- COMP4xxx Research Methods

24 units from completion of a COMP research specialization

6 units from completion of COMP course

6 units from completion of a 4000 level COMP courses

12 units from completion of courses from the following:

- courses listed in a COMP research specialization
- courses listed in a COMP software development specialization
- VCUG3001 Unravelling Complexity
- VCUG3002 Mobilising Research
- ENGN3230 Engineering Innovation

6 units from completion of courses from the following:

- COMP Computer Sciences
- MATH1013 Mathematics and Applications 1
- MATH1014 Mathematics and Applications 2
- MATH1115 Mathematics and Applications 1 (Honours)
- MATH1116 Mathematics and Applications 2 (Honours)
- MATH2310 Games, Graphs and Machines
- ENGN1211 Discovering Engineering
- STAT1008 Quantitative Research Methods
- STAT1003 Statistical Techniques

24 units from completion of COMP4550 Advanced Computing Research Project

48 units from completion of elective courses offered by ANU
Amendment to Academic Award

HONS4700 Final Honours Grade will be used to record the Class of Honours and the Mark.

The Honours Mark will be a weighted average percentage mark (APM) calculated by first calculating the average mark for 1000, 2000, 3000 and 4000 level courses. We denote these averages: A1, A2, A3, and A4 respectively. The averages are computed based on all units counted towards satisfaction of degree requirements, excluding non-COMP electives. Finally these averages are combined using the formula

\[
APM = (0.1 \times A1) + (0.2 \times A2) + (0.3 \times A3) + (0.4 \times A4).
\]

The APM will then be used to determine the final grade according to the ANU Honours grading scale, found at www.anu.edu.au/students/program-administration/assessments-exams/grading-scale.

Learning outcomes

- Learning outcomes are high-level statements of the skills and knowledge which ANU certifies that all graduates of the Award possess.
- For Vertical Double Degrees and Double Masters Degrees, provide full learning outcomes for both degrees.
- This section is published on the ‘Programs and Courses’ website to an external audience.

Upon successful completion, students will be able to:

- define and analyse complex problems, and design, implement and evaluate solutions that demonstrate an understanding of the systems context in which software is developed and operated including economic, social, historical, sustainability and ethical aspects.
- demonstrate an operational and theoretical understanding of the foundations of computer science including programming, algorithms, logic, architectures and data structures
- recognise connections and recurring themes, including abstraction and complexity, across the discipline
- adapt to new environments and technologies, and to innovate
- demonstrate an understanding of deep knowledge in at least one area of computer science
- communicate complex concepts effectively with diverse audiences using a range of modalities
- work effectively within teams in order to achieve a common goal
- demonstrate commitment to professional conduct and development that recognises the social, legal and ethical implications of their work, to work independently, and self- and peer-assess performance.
- demonstrate an understanding of the fundamentals of research methodologies, including defining research problems, background reading and literature review, designing experiments, and effectively communicating results.
- apply research methods to the solution of contemporary research problems in computer science.

Admission requirements

Undergraduate

- ATAR, QLD Band and International Baccalaureate score.
- Include any other requirements, such as current ‘Working with Vulnerable People’ check, successful medical check, etc.
- Include secondary schooling prerequisites
- This section is published on the ‘Programs and Courses’ website to an external audience.
Honours plans (without specialisations)

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete numbered items if not required. Note: Item 1 is not required if the degree name is specified.
- Choose only one option from a, b or c.
- A maximum of 12 courses may be specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:
1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in cognate disciplines, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. with at least:
   a. _____ courses in the subject area _____ [with at least _____ 3000-level courses or equivalent].
   b. a [major][minor][specialisation] or equivalent in _____.
   c. with the following courses or equivalent:
4. with the written approval of an identified supervisor for the research project
   with the written approval of an identified supervisor for the thesis

Honours plans (with specialisations)

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete Item 1 if the degree name is specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:
1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in the discipline cognate to the honours specialisation, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. and the satisfaction of any further requirements specified in the relevant honours specialisation.

Direct-entry Graduate Coursework

- Complete the template below only if the admission requirements are being amended
- Final admission requirements will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean.
- This section is published on the ‘Programs and Courses’ website to an external audience.

A Bachelor degree or international equivalent

- with an average mark of at least Enter average [Delete if not required]
- with at least Enter number of courses courses in the field of Enter description [Delete if not required]
- with at least Enter years years’ work experience in Enter area [Delete if not required]
- with the approval of an identified supervisor for the research project/thesis. [Delete if not required]
- with a successful assessment of a portfolio of works. [Delete if not required]
- with a successful audition. [Delete if not required]
- with a Enter other requirement e.g. successful medical assessment [Delete if not required]
Cognate disciplines (Honours and Graduate coursework only)

- List each discipline considered to be ‘cognate’ for the purposes of admission and credit on a new line.
- This section is published on the ‘Programs and Courses’ website to an external audience.

Click here to enter text

Delivery

Current delivery mode(s): In person - 75% or more on campus, maximum 25% of courses online

New delivery mode(s) if changing: Select delivery mode

- Will now include compulsory work-based training of Enter hours hours per week for Enter weeks weeks.
- No longer includes compulsory work-based training

- Will now be off campus – this Award is now to be administered and completed externally to the Acton campus.
- No longer off campus – this Award is now to be administered and completed at the Acton campus.
- Will now be Intensive – this Award is now to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.
  - Intensive duration in weeks (from commencement to submission of final assessment): e.g. “24”
- No longer intensive – this Award is no longer to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.
- Will now be registered on CRICOS (subject to assessment by TEQSA).
- No longer to be registered on CRICOS.

List all teaching periods in which students may commence study.

- i.e. Summer, First Semester, Autumn, Winter, Second Semester and/or Spring
- Note that international student visa holders must be able to complete within the normal duration of study without the need to ‘underload’ or take leave.

Click here to enter text

- International student visa holders are able to complete within the normal duration of study without the need to ‘underload’ or take leave when commencing in all listed teaching periods.

ANU Graduate Coursework model (Graduate Coursework only)

- This Award is consistent with the University’s Graduate Coursework Model
- This Award requires approval as an exception to the ANU Graduate Coursework model.
- For low-enrolment Graduate Certificates and Graduate Diplomas, provide a strategic case for retention of this Award and attach all available evidence.
- For Masters Degrees requiring more or less than 96 units, or with admission requirements other than a non-cognate Bachelor Degree, provide significant justification for creation of this Award (e.g. professional accreditation or international standards) and attach all available evidence.

Click here to enter text
Assessment alignment (Bachelor Honours Degrees only)

- If the learning outcomes are being amended, provide an explanation of how the structure of assessment determines whether the Honours learning outcomes have been met.

This degree is an embedded honours 4 year programs. Similar to the engineering degrees within the college. There is no distinct honours year but the program includes at least 48 units of AQF8 courses.

The Honours Mark is a weighted average percentage mark (APM) calculated by first calculating the average mark for 1000, 2000, 3000 and 4000 level courses. We denote these averages: A1, A2, A3, and A4 respectively. The averages are computed based on all units counted towards satisfaction of degree requirements, excluding non-COMP electives. Finally these averages are combined using the formula:

$$\text{APM} = (0.1 \times A1) + (0.2 \times A2) + (0.3 \times A3) + (0.4 \times A4).$$

The APM will then be used to determine the final grade according to the ANU Honours grading scale.

Timing of Honours assessment (Bachelor Honours Degrees only)

- If the Study requirements and Orders are being amended, provide an explanation of how either: a minimum of 25% of the assessment which contributes to the final honours grade or; 15% of the assessment which contributes to the final Honours mark and formalised monitoring of progress by staff other than each student’s supervisor or Honours convener is completed in the first half (in terms of duration) of Honours study.

Determination of the Honours grade is as shown above.

Honours research training availability (Bachelor Honours Degrees only)

- If the Study requirements and Orders or the teaching periods in which students may commence study are being amended, and Honours research training courses are to be available to students only once per calendar year, describe the strategies to be used to ensure that students who commence Honours in the Period in which these courses are not taught will not be disadvantaged.

As this is an embedded honours degree students develop research skills and methods in the years leading up to their final year in which they normally do their large honours project. As such students will only commence their honours project after they have obtained the expected background.

Research component (Masters Degrees only)

- Provide an explanation of and list of courses for how the AQF Level 9 Masters Degree (Coursework) requirement that graduates must be able to "plan and execute a substantial research-based project, capstone experience and/or piece of scholarship" is demonstrated.

**Click here to enter text**

Typical full-time pattern of study

*Complete fields in this section only if the current details are being changed.*

Provide typical full-time patterns of study f for each teaching period in which students may commence study.

- Each study pattern should demonstrate completion of the Orders given above in the full-time duration.
- Give the course type, level and unit value in each cell (see Examples below).
- Cells should be merged for courses of 12 or more units.
- Copy and paste rows as needed

| Year 1 | COMP1100 6 units | MATH1005 6 units | COMP Elective 6 units | Elective 6 units |
| Year 2 | COMP1110 6 units | COMP16XX 6 units | COMP Elective 6 units | Elective 6 units |
|        | COMP2100 6 units | COMP2300 6 units | COMP24XX 6 units     | Elective 6 units |
|        | COMP3600 6 units | COMP2310 6 units | COMP2130 6 units     | Elective 6 units |
| Year 3 | COMP Research Specialization 6 units | 3000-level COMP Elective 6 units | 3000-level COMP Elective 6 units | Elective 6 units |
|        | COMP Research Specialization 6 units | COMP4XXX Research Methods 6 units | 4000 level COMP Elective 6 units | Elective 6 units |
| Year 4 | COMP Research Specialization 6 units | COMP4550 12 units | Elective 6 units |
|        | COMP Research Specialization 6 units | COMP4550 12 units | Elective 6 units |

Mid-year entry:

| Year 1 (starting S2) | COMP1100 6 units | COMP16XX 6 units | COMP Elective 6 units | Elective 6 units |
| Year 2               | COMP1110 6 units | MATH1005 6 units | COMP24XX 6 units     | COMP2300 6 units |
|                      | COMP2310 6 units | COMP Elective 6 units | Elective 6 units |
| Year 3               | COMP Research Specialization 6 units | COMP2100 6 units | 3000-level COMP Elective 6 units | Elective 6 units |
|                      | COMP3600 6 units | COMP4XXX Research Methods 6 units | COMP2130 6 units | Elective 6 units |
| Year 4               | COMP Research Specialization 6 units | 3000-level COMP Elective 6 units | 4000 level COMP Elective 6 units | Elective 6 units |
|                      | COMP Research Specialization 6 units | COMP4550 12 units | Elective 6 units |
Amendment to Academic Award

Year 5 (completing S1) | COMP Research Specialization 6 units | COMP4550 12 units | Elective 6 units

Fees

Current fee places: Select fee places
New fee places if changing: Select fee places

- For Awards adding International Student Fee places, identify an existing Award with the same indicative international student fee (see the annual fee schedule).

- Provide details of additional costs, such as compulsory fieldwork expenses (excludes SA Fee).

Division of Student Administration use only

☐ Consistent with Australian Qualifications Framework, including Level 9 research component where relevant

If not consistent, give details:

☐ Consistent with National Code 2007

If not consistent, give details:

☐ Consistent with policy: Academic Programs and Courses Accreditation

If not consistent, give details:

☐ Consistent with policy: Nomenclature

If not consistent, give details:

☐ Consistent with policy: Structure and Wording of Coursework Award Requirements, including Registrar approval

If not consistent, give details:

☐ Consistent with other relevant University policies and standards (e.g. Admission requirements template)

If not consistent, give details:

Is this becoming the default plan within a single degree program?

Click to select an option

☐ Australian Higher Education Graduate Statement is appropriate and accurate

If not appropriate/accurate, provide new AHEGS below (copy and paste for multiple plans as necessary).

Detail of Plan - Australian Higher Education Graduation Statement (AHEGS)

Click here to enter text
Plan Features - Australian Higher Education Graduation Statement (AHEGS)

Plan Pathway - Australian Higher Education Graduation Statement (AHEGS)

Plan Accreditation - Australian Higher Education Graduation Statement (AHEGS)

College Education Committee

Date reviewed by College Education Committee (CEC)  Click here to enter a date
CEC recommendation to UEC
☐ Endorse with no conditions
☐ Endorse with conditions (specified below)
☐ Do not endorse

As approved by the Dean or delegated authority
e.g. “Professor Marco Polo” on Click here to enter a date

University Education Committee

Date reviewed by University Education Committee (UEC)  Click here to enter a date
Document Number  e.g. “231/2010”
UEC recommendation to Academic Board
☐ Accredit with no conditions
☐ Accredit with conditions (specified below)
☐ Do not accredit

Academic Board

Date considered by Academic Board  Click here to enter a date
Document Number  e.g. “231/2010”
Academic Board
☐ Accredits with no conditions from Click here to enter a date
☐ Accredits with conditions (specified below) from Click here to enter a date
☐ Does not accredit
Amendment to Academic Award (Coursework)

How to use this form

If you intend to change any of the following details, please instead complete a New Academic Award (Coursework) Expression of Interest / Proposal. Fields for these details are marked with ☐ throughout this form. Changes in marked fields will not be approved or processed.

- Award name
- Augmentation name (Masters Degrees only)
- Australian Qualifications Framework qualification level and type
- Full-time duration in years
- Units required for completion

A significant change to mode of delivery (e.g. becoming 100% online or offshore) may require a Award proposal. In such cases, please email policy.regs@anu.edu.au to discuss.

Expected turn-around times (after College Education Committee endorsement)

| Amendment requiring no revision or further information | Three months |
| Amendment requiring some revision or further information | Six months |
| Amendment requiring some revision or further information, and further consultation | Nine months |

Please note that turnaround times are for ANU accreditation. Changes to international fee places, mode of delivery or work-based training requirements may affect CRICOS registration and require additional time.

To fill out this Microsoft Word Form, click underlined italicised grey text, e.g. Click here to enter a date, then make a selection or enter text.

To edit the program title and code in the document header, first double click in the header area. Once edited, the header will be updated on all pages.

Long-answer text fields allow the use of standard formatting features, such as bullet points, and will span pages if necessary.

If you would like to provide feedback on this form, please email policy.regs@anu.edu.au. Attachments with comments and/or tracked changes are welcome.

Details

Award name
Bachelor of Advanced Computing (Research and Development)

Masters Augmentation (where relevant)
Plan code  

Australian Qualifications Framework level and Award type  

External accreditation body (if any)  

Full-time duration in years  

Units required for completion  

Amendment effective from:  

(Note: all amendments effective 1 January)  

Linked qualifications  

- If this is a pathway or an exit Award, please name the linked Awards. For information on pathways and exit Awards, please see Policy: Academic Programs and Courses Accreditation 

Click here to enter text  

Double degrees  

- Is this plan part of a double degree?  
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 4 Year)  
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 5 Year)  
  - Flexible Double Degree (Law, Engineering and Advanced Computing 6 Year)  
  - Flexible Double Degree (Law)  
  - Flexible Double Degree (Engineering and Advanced Computing)  
  - Vertical Double Degree  
  - Double Masters Degree  

Governance  

Responsible College  

Who is the convener of the Award?  

Does this Award have a dedicated governance committee or advisory board (other than College Education Committee)? If so, detail membership and frequency of meetings.  

The Research School of Computer Science operates a Curriculum Development Committee. The membership consists of the Head of School, Associate Director Education (Chair), Associate Director (Education) from Engineering, the Convenors of each of the programs offered by the School (the BIT, BAC, BSEng, Honours and the MComp), three other academics from the School, the Manager (Student Services) or representative and a representative from the Information Systems group, CBE. The CDC meets at least twice per semester. 

There is also an Industry Advisory Board that meets twice a year and provides input into the programs run by the School, amongst other things.  

Have proposed changes been endorsed by the governance committee or advisory board?  

Click to select an option
Summary

Provide an executive summary of this proposal for University Education Committee and Academic Board (100 words or fewer).

Over some period of time, there has been a discussion within the Research School of Computer Science (RSCS) concerning the nature and content of the undergraduate education programs, including the Bachelor of Advanced Computing. Most recently, this led to the creation of a working group charged with reviewing prior discussions and determining a way forward.

The working group consulted with a number of groups, including industry, students, and ANU academic stakeholders outside of RSCS. In addition CECS commissioned an external company – the Knowledge Partnership – to undertake some market research on our programs and related programs.

Based on the input from the above consultations, the purpose and graduate attributes of the three main program offerings of the School, namely, the Bachelor of Information Technology, the Bachelor of Software Engineering (Honours) and the Bachelor of Advanced Computing (Honours), were reviewed and refined, with a view to the future. Considerable effort was devoted to better characterising these programs.

The revised Bachelor of Advanced Computing (Research and Development) reflects the changes made in the other degree programs in the school whilst maintaining it’s distinctive focus on research and development and catering for an elite group of students.

The revised BAC (R&D) has a focus on the science of computing and its purpose is to provide skills and capabilities for with a particular focus scientific innovation and research and development within the field of computing.

Consultation

Complete fields in this section only where consultation has been undertaken.

Academic consultation

- Includes ANU and external consultation about academic merit and strategic alignment, contribution to teaching, cross-College disciplines, and cross-College pathway degrees
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

[Click here to enter text]

Consultation with Division of Student Administration

- Includes degree structures, nomenclature, AQF and legislative compliance, Commonwealth support, CRICOS eligibility
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

[Click here to enter text]

Consultation with Division of Student Services

- Includes support for specific cohorts, international students under the age of 18
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

[Click here to enter text]
Consultation with Division of International Operations and Student Recruitment

- Includes admissions, student recruitment, international agreements, international experiences, University publications
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Click here to enter text

Consultation with Information Technology Services

- Includes support for specific software and infrastructure needs
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Click here to enter text

Consultation with ANU Library

- Includes access to specific online and physical collections, specialist information literacy training
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Click here to enter text

Note that insufficient consultation may preclude or delay approval or implementation

Description and requirements

Complete fields in this section only if the current details are being changed.

Marketing and publication description

- This section is published on the ‘Programs and Courses’ website to an external audience and is used primarily for marketing.
- Describe the Award including any key features, its research led elements and any external accreditation of the plan (100 words of fewer).

If you want to find out what drives (and how to work for) companies like Google, Microsoft, Apple or Facebook, you are looking at the right degree.

This is a unique, interdisciplinary program that will prepare you to be a future leader of the information and communications technology revolution.

As a degree accredited by the Australian Computer Society you will not only learn advanced computing techniques and have the opportunity to complete a unique major, but also develop exceptional professional skills in areas of entrepreneurship and management.

While some of our students are developing code which controls unmanned aerial vehicles, others are busy writing algorithms to mine through Petabytes of data. If mastering challenging projects is your thing, the ANU Bachelor of Advanced Computing can launch you into a spectacular career.

Study requirements and Orders

- Provide requirements for the completion of this Award.
- New courses must be approved before being entered into requirements.
• For Vertical Double Degree undergraduate plans and Double Masters Degrees, provide full requirements for the double degree (i.e. both Awards).
• Orders will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean to then be made by the Deputy Vice-Chancellor (Academic) (see Undergraduate Awards Rules and Graduate Awards Rules).
• This section is published on the ‘Programs and Courses’ website to an external audience.

The Bachelor of Advanced Computing (Honours) requires completion of 192 units, of which:

• A maximum of 60 units may come from completion of 1000-level courses

The 192 units must include:

90 units from completion of compulsory courses from the following list:
• COMP1130 Introduction to Programming and Algorithms (Advanced)
• COMP1140 Introduction to Software Systems (Advanced)
• MATH1005 Discrete Mathematical Models
• MATH1013 Mathematics and Applications 1 or MATH1115 Mathematics and Applications 1 (Honours)
• MATH1014 Mathematics and Applications 2 (Honours) or MATH1116 Mathematics and Applications 2 (Honours) or STAT1008 Quantitative Research Methods or STAT1003 Statistical Techniques
• COMP16xx Theoretical Foundations of Computer Science
• COMP24xx Introduction to Data Management, Analysis and Security
• COMP2100 Software Construction
• COMP2300 Introduction to Computer Systems
• COMP2310 Concurrent & Distributed Systems
• COMP2130 Software Analysis and Design
• COMP3XXX Individual research project (12 units)
• COMP2550 Advanced Computing R&D Methods
• COMP2560 Studies in Advanced Computing R&D

24 units from completion of a COMP research specialization

6 units from completion of a 3000 or 4000 level COMP course

24 units from completion of COMP4550 Advanced Computing Research Project

48 units from completion of elective courses offered by ANU

HONS4700 Final Honours Grade will be used to record the Class of Honours and the Mark.

The Honours Mark will be a weighted average percentage mark (APM) calculated by first calculating the average mark for 1000, 2000, 3000 and 4000 level courses. We denote these averages: A1, A2, A3, and A4 respectively. The averages are computed based on all units counted towards satisfaction of degree requirements, excluding non-COMP electives. Finally these averages are combined using the formula APM = (0.1 X A1) + (0.2 X A2) + (0.3 X A3) + (0.4 X A4).

The APM will then be used to determine the final grade according to the ANU Honours grading scale, found at www.anu.edu.au/students/program-administration/assessments-exams/grading-scale.

Learning outcomes
• Learning outcomes are high-level statements of the skills and knowledge which ANU certifies that all graduates of the Award possess.
• For Vertical Double Degrees and Double Masters Degrees, provide full learning outcomes for both degrees.
This section is published on the ‘Programs and Courses’ website to an external audience.

*Upon successful completion, students will be able to:*

- define and analyse complex problems, and design, implement and evaluate solutions that demonstrate an understanding of the systems context in which software is developed and operated including economic, social, historical, sustainability and ethical aspects,
- demonstrate an operational and theoretical understanding of the foundations of computer science including programming, algorithms, logic, architectures and data structures,
- recognise connections and recurring themes, including abstraction and complexity, across the discipline,
- adapt to new environments and technologies, and to innovate,
- demonstrate an understanding of deep knowledge in at least one area of computer science,
- communicate complex concepts effectively with diverse audiences using a range of modalities,
- work effectively within teams in order to achieve a common goal,
- demonstrate commitment to professional conduct and development that recognises the social, legal and ethical implications of their work, to work independently, and self- and peer-assess performance,
- demonstrate a deep understanding of the fundamentals of research methodologies, including defining research problems, background reading and literature review, designing experiments, and effectively communicating results,
- proficiently apply research methods to the solution of contemporary research problems in computer science, and
- demonstrate an understanding of research processes including research proposals, article reviewing, and ethics clearance.

**Admission requirements**

**Undergraduate**

- ATAR, QLD Band and International Baccalaureate score.
- Include any other requirements, such as current ‘Working with Vulnerable People’ check, successful medical check, etc.
- Include secondary schooling prerequisites
- This section is published on the ‘Programs and Courses’ website to an external audience.

*Click here to enter text*

**Honours plans (without specialisations)**

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete numbered items if not required. Note: Item 1 is not required if the degree name is specified.
- Choose only one option from a, b or c.
- A maximum of 12 courses may be specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:

1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70% per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in cognate disciplines, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. with at least:
   a. _____ courses in the subject area _____ [with at least _____ 3000-level courses or equivalent].
b. a [major][minor][specialisation] or equivalent in _____.

c. with the following courses or equivalent:

4. with the written approval of an identified supervisor for the research project

with the written approval of an identified supervisor for the thesis

Honours plans (with specialisations)

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete Item 1 if the degree name is specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:

1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in the discipline cognate to the honours specialisation, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. and the satisfaction of any further requirements specified in the relevant honours specialisation.

Direct-entry Graduate Coursework

- Complete the template below only if the admission requirements are being amended
- Final admission requirements will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean.
- This section is published on the ‘Programs and Courses’ website to an external audience.

A Bachelor degree or international equivalent

- with an average mark of at least Enter average [Delete if not required]
- with at least Enter number of courses courses in the field of Enter description [Delete if not required]
- with at least Enter years years’ work experience in Enter area [Delete if not required]
- with the approval of an identified supervisor for the research project/thesis. [Delete if not required]
- with a successful assessment of a portfolio of works. [Delete if not required]
- with a successful audition. [Delete if not required]
- with a Enter other requirement e.g. successful medical assessment [Delete if not required]

Cognate disciplines (Honours and Graduate coursework only)

- List each discipline considered to be ‘cognate’ for the purposes of admission and credit on a new line.
- This section is published on the ‘Programs and Courses’ website to an external audience.

Click here to enter text

Delivery

Current delivery mode(s): In person - 75% or more on campus, maximum 25% of courses online

New delivery mode(s) if changing: Select delivery mode

☐ Will now include compulsory work-based training of Enter hours hours per week for Enter weeks weeks.

☐ No longer includes compulsory work-based training
Will now be off campus – this Award is now to be administered and completed externally to the Acton campus.

No longer off campus – this Award is now to be administered and completed at the Acton campus.

Will now be Intensive – this Award is now to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.

Intensive duration in weeks (from commencement to submission of final assessment): e.g. “24”

No longer intensive – this Award is no longer to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.

Will now be registered on CRICOS (subject to assessment by TEQSA).

No longer to be registered on CRICOS.

List all teaching periods in which students may commence study.

- i.e. Summer, First Semester, Autumn, Winter, Second Semester and/or Spring
- Note that international student visa holders must be able to complete within the normal duration of study without the need to ‘underload’ or take leave.

International student visa holders are able to complete within the normal duration of study without the need to ‘underload’ or take leave when commencing in all listed teaching periods.

ANU Graduate Coursework model (Graduate Coursework only)

- This Award is consistent with the University’s Graduate Coursework Model
- This Award requires approval as an exception to the ANU Graduate Coursework model.
  - For low-enrolment Graduate Certificates and Graduate Diplomas, provide a strategic case for retention of this Award and attach all available evidence.
  - For Masters Degrees requiring more or less than 96 units, or with admission requirements other than a non-cognate Bachelor Degree, provide significant justification for creation of this Award (e.g. professional accreditation or international standards) and attach all available evidence.

Assessment alignment (Bachelor Honours Degrees only)

- If the learning outcomes are being amended, provide an explanation of how the structure of assessment determines whether the Honours learning outcomes have been met.

This degree is an embedded honours 4 year programs. Similar to the engineering degrees within the college. There is no distinct honours year but the program includes at least 48 units of AQF8 courses.

The Honours Mark is a weighted average percentage mark (APM) calculated by first calculating the average mark for 1000, 2000, 3000 and 4000 level courses. We denote these averages: A1, A2, A3, and A4 respectively. The averages are computed based on all units counted towards satisfaction of degree requirements, excluding non-COMP electives. Finally these averages are combined using the formula $\text{APM} = (0.1 \times A1) + (0.2 \times A2) + (0.3 \times A3) + (0.4 \times A4)$.

The APM will then be used to determine the final grade according to the ANU Honours grading scale.
Amendment to Academic Award

Timing of Honours assessment (Bachelor Honours Degrees only)

- If the Study requirements and Orders are being amended, provide an explanation of how either: a minimum of 25% of the assessment which contributes to the final honours grade or; 15% of the assessment which contributes to the final Honours mark and formalised monitoring of progress by staff other than each student’s supervisor or Honours convener is completed in the first half (in terms of duration) of Honours study.

Determination of the Honours grade is as shown above.

Honours research training availability (Bachelor Honours Degrees only)

- If the Study requirements and Orders or the teaching periods in which students may commence study are being amended, and Honours research training courses are to be available to students only once per calendar year, describe the strategies to be used to ensure that students who commence Honours in the Period in which these courses are not taught will not be disadvantaged.

As this is an embedded honours degree students develop research skills and methods in the years leading up to their final year in which they normally do their large honours project. As such students will only commence their honours project after they have obtained the expected background.

Research component (Masters Degrees only)

- Provide an explanation of and list of courses for how the AQF Level 9 Masters Degree (Coursework) requirement that graduates must be able to “plan and execute a substantial research-based project, capstone experience and/or piece of scholarship” is demonstrated.

Click here to enter text

Typical full-time pattern of study

Complete fields in this section only if the current details are being changed.

Provide typical full-time patterns of study for each teaching period in which students may commence study.

- Each study pattern should demonstrate completion of the Orders given above in the full-time duration.
- Give the course type, level and unit value in each cell (see Examples below).
- Cells should be merged for courses of 12 or more units.
- Copy and paste rows as needed

<table>
<thead>
<tr>
<th>Year 1</th>
<th>COMP1130 6 units</th>
<th>MATH1005 6 units</th>
<th>MATH1013 6 units</th>
<th>Elective 6 units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COMP1140 6 units</td>
<td>COMP16XX 6 units</td>
<td>MATH1014 6 units</td>
<td>COMP2550 6 units</td>
</tr>
<tr>
<td>Year 2</td>
<td>COMP2100 6 units</td>
<td>COMP2300 6 units</td>
<td>COMP24XX 6 units</td>
<td>COMP3XXX 6 units</td>
</tr>
<tr>
<td></td>
<td>COMP2130 6 units</td>
<td>COMP2310 6 units</td>
<td>COMP2560 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year</td>
<td>COMP Research Specialization 6 units</td>
<td>COMP3XXX project 6 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------</td>
<td>--------------------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Year 3</td>
<td>COMP Research Specialization 6 units</td>
<td>3000/4000-level COMP Elective 6 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 4</td>
<td>COMP Research Specialization 6 units</td>
<td>COMP4550 12 units</td>
<td>Elective 6 units</td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td>COMP Research Specialization 6 units</td>
<td>COMP4550 12 units</td>
<td>Elective 6 units</td>
<td></td>
</tr>
</tbody>
</table>
Mid-year entry:

<table>
<thead>
<tr>
<th>Year 1</th>
<th>COMP1130 6 units</th>
<th>COMP16XX 6 units</th>
<th>MATH1013 6 units</th>
<th>Elective 6 units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COMP1140 6 units</td>
<td>MATH1005 6 units</td>
<td>COMP24XX 6 units</td>
<td>COMP2300 6 units</td>
</tr>
<tr>
<td>Year 2</td>
<td>COMP2310 6 units</td>
<td>COMP2550 6 units</td>
<td>MATH1014 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td></td>
<td>COMP3XXX project 6 units</td>
<td>COMP2100 6 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 3</td>
<td>COMP Research Specialization 6 units</td>
<td>COMP3XXX project 6 units</td>
<td>COMP2560 6 units</td>
<td>COMP2130 6 units</td>
</tr>
<tr>
<td></td>
<td>COMP Research Specialization 6 units</td>
<td>3000/4000-level COMP Elective 6 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 4</td>
<td>COMP Research Specialization 6 units</td>
<td>COMP4550 12 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 5</td>
<td>COMP Research Specialization 6 units</td>
<td>COMP4550 12 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>(completing S1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Fees**

Current fee places: Select fee places

New fee places if changing: Select fee places

- For Awards adding International Student Fee places, identify an existing Award with the same indicative international student fee (see the annual fee schedule).

  *Click here to enter text*

- Provide details of additional costs, such as compulsory fieldwork expenses (excludes SA Fee).

  *Click here to enter text*

**Division of Student Administration use only**

- □ Consistent with Australian Qualifications Framework, including Level 9 research component where relevant
  
  If not consistent, give details:

  *Click here to enter text*

- □ Consistent with National Code 2007
  
  If not consistent, give details:

  *Click here to enter text*
Consistent with policy: Academic Programs and Courses Accreditation
If not consistent, give details: 
[Click here to enter text]

Consistent with policy: Nomenclature
If not consistent, give details: 
[Click here to enter text]

Consistent with policy: Structure and Wording of Coursework Award Requirements, including Registrar approval
If not consistent, give details: 
[Click here to enter text]

Consistent with other relevant University policies and standards (e.g. Admission requirements template)
If not consistent, give details: 
[Click here to enter text]

Is this becoming the default plan within a single degree program?
Click to select an option

Australian Higher Education Graduate Statement is appropriate and accurate
If not appropriate/accurate, provide new AHEGS below (copy and paste for multiple plans as necessary).

Detail of Plan - Australian Higher Education Graduation Statement (AHEGS)
[Click here to enter text]

Plan Features - Australian Higher Education Graduation Statement (AHEGS)
[Click here to enter text]

Plan Pathway - Australian Higher Education Graduation Statement (AHEGS)
[Click here to enter text]

Plan Accreditation - Australian Higher Education Graduation Statement (AHEGS)
[Click here to enter text]

College Education Committee
Date reviewed by College Education Committee (CEC) 
[Click here to enter a date]

CEC recommendation to UEC
☐ Endorse with no conditions
☐ Endorse with conditions (specified below)
☐ Do not endorse

[Click here to enter text]

As approved by the Dean or delegated authority 
e.g. “Professor Marco Polo” on [Click here to enter a date]

University Education Committee
Amendment to Academic Award

Date reviewed by University Education Committee (UEC)  
Document Number  

UEC recommendation to Academic Board  
☐ Accredit with no conditions  
☐ Accredit with conditions (specified below)  
☐ Do not accredit  

Click here to enter text

Academic Board

Date considered by Academic Board  
Document Number  

Academic Board  
☐ Accredits with no conditions from Click here to enter a date  
☐ Accredits with conditions (specified below) from Click here to enter a date  
☐ Does not accredit  

Click here to enter text
Amendment to Academic Award (Coursework)

How to use this form

If you intend to change any of the following details, please instead complete a New Academic Award (Coursework) Expression of Interest / Proposal. Fields for these details are marked with © throughout this form. Changes in marked fields will not be approved or processed.

- Award name
- Augmentation name (Masters Degrees only)
- Australian Qualifications Framework qualification level and type
- Full-time duration in years
- Units required for completion

A significant change to mode of delivery (e.g. becoming 100% online or offshore) may require a Award proposal. In such cases, please email policy.reg@anu.edu.au to discuss.

Expected turn-around times (after College Education Committee endorsement)

| Amendment requiring no revision or further information | Three months |
| Amendment requiring some revision or further information | Six months |
| Amendment requiring some revision or further information, and further consultation | Nine months |

Please note that turnaround times are for ANU accreditation. Changes to international fee places, mode of delivery or work-based training requirements may affect CRICOS registration and require additional time.

To fill out this Microsoft Word Form, click underlined italicised grey text, e.g. 41T, then make a selection or enter text.

To edit the program title and code in the document header, first double click in the header area. Once edited, the header will be updated on all pages.

Long-answer text fields allow the use of standard formatting features, such as bullet points, and will span pages if necessary.

If you would like to provide feedback on this form, please email policy.reg@anu.edu.au. Attachments with comments and/or tracked changes are welcome.

Details

| Award name | Bachelor of Software Engineering© |
| Masters Augmentation (where relevant) | 41T© |
Amendment to Academic Award

Plan code: 4708ASENG

Australian Qualifications Framework level and Award type

External accreditation body (if any): Engineers Australia, Australian Computer Society

Full-time duration in years: 4

Units required for completion: 192

Amendment effective from: 1 January

(Note: all amendments effective 1 January)

Linked qualifications

- If this is a pathway or an exit Award, please name the linked Awards. For information on pathways and exit Awards, please see Policy: Academic Programs and Courses Accreditation

Full-time duration in years

Units required for completion

Amendment effective from

Double degrees

- Is this plan part of a double degree?
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 4 Year)
  - Flexible Double Degree (Arts, Social Sciences, Sciences and Business 5 Year)
  - Flexible Double Degree (Law, Engineering and Advanced Computing 6 Year)
  - Flexible Double Degree (Law)
  - Flexible Double Degree (Engineering and Advanced Computing)
  - Vertical Double Degree
  - Double Masters Degree

Governance

Responsible College: ANU College of Engineering & Computer Science

Who is the convener of the Award?: Dr Shayne Flint

Does this Award have a dedicated governance committee or advisory board (other than College Education Committee)? If so, detail membership and frequency of meetings.

The Research School of Computer Science operates a Curriculum Development Committee. The membership consists of the Head of School, Associate Director Education (Chair), Associate Director (Education) from Engineering, the Convenors of each of the programs offered by the School (the BIT, BAC, BSEng, Honours and the MComp), three other academics from the School, the Manager (Student Services) or representative and a representative from the Information Systems group, CBE. The CDC meets at least twice per semester.

There is also an Industry Advisory Board that meets twice a year and provides input into the programs run by the School, amongst other things. The BSEng convener also sits on the Research School of Engineering Industry Advisory Board which also provides input to the software engineering program.

Have proposed changes been endorsed by the governance committee or advisory board?

Comment [SF2]: Word on Mac cannot edit these fields

Comment [SF3]: 2017

Comment [SF4]: need to select the groups
Summary

Provide an executive summary of this proposal for University Education Committee and Academic Board (100 words or fewer).

Over some period of time, there has been a discussion within the Research School of Computer Science (RSCS) concerning the nature and content of the undergraduate education programs, including the Bachelor of Software Engineering (Honours). Most recently, this led to the creation of a working group charged with reviewing prior discussions and determining a way forward.

The working group consulted with a number of groups, including industry, students, and ANU academic stakeholders outside of RSCS. In addition, CECS commissioned an external company – the Knowledge Partnership – to undertake some market research on our programs and related programs.

Based on the input from the above consultations, the purpose and graduate attributes of the three program offerings of the School, namely, the Bachelor of Information Technology, the Bachelor of Software Engineering (Honours) and the Bachelor of Advanced Computing (Honours), were reviewed and refined, with a view to the future. Considerable effort was devoted to better characterising these programs.

The core of the revised BSEng (Honours) is undertaken in the first two years and is a superset of the core of the BIT and BAC (Honours). This allows for easy transition across the programs (except for the R&D program) in the first two years of study.

The revised BSEng (Honours) has a focus on the engineering of computer software and its purpose is to provide the skills and capabilities for professional software engineering practice, innovation and research. Through this program students develop an appreciation that computing interacts with many different domains and that solutions to many problems require both computing skills and domain knowledge, as well as the ability to communicate with, and learn from, experts from different domains and an ability to construct safe, reliable and effective software systems at scale and develop new software engineering practices and technologies.

Consultation

Complete fields in this section only where consultation has been undertaken.

Academic consultation

- Includes ANU and external consultation about academic merit and strategic alignment, contribution to teaching, cross-College disciplines, and cross-College pathway degrees
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consulted with Lilia Ferraro and Steve Roberts, MSI; Brownwen Whiting, CBE and Royston Gustavson, CASS;

Consultation with Division of Student Administration

- Includes degree structures, nomenclature, AQF and legislative compliance, Commonwealth support, CRICOS eligibility
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of Student Services

41T

3|THE AUSTRALIAN NATIONAL UNIVERSITY
Amendment to Academic Award

- Includes support for specific cohorts, international students under the age of 18
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Division of International Operations and Student Recruitment
- Includes admissions, student recruitment, international agreements, international experiences, University publications
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with Information Technology Services
- Includes support for specific software and infrastructure needs
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Consultation with ANU Library
- Includes access to specific online and physical collections, specialist information literacy training
- Include evidence of consultation, such as meeting dates, links to published minutes, etc.

Note that insufficient consultation may preclude or delay approval or implementation

Description and requirements

Complete fields in this section only if the current details are being changed.

Marketing and publication description

- This section is published on the ‘Programs and Courses’ website to an external audience and is used primarily for marketing.
- Describe the Award including any key features, its research led elements and any external accreditation of the plan (100 words of fewer).

Software Engineering is about building effective software systems that address complex problems in a broad range of domains including transport, communications, finance, medicine, science, entertainment and the arts.

The Bachelor of Software Engineering (Honours) is a four-year program accredited by Engineers Australia and the Australian Computer Society. Graduates will obtain skills and capabilities for professional software engineering practice, innovation and research. We adopt a systems approach to software engineering that not only covers the technical aspects of professional practice, innovation and research, but also the complex socio-technical context in which these activities occur. This includes approaches to dealing with uncertainty and risk, design, modern management practices, ethics and communication.

BSEng students develop these skills and capabilities through a balance of theoretical study, practice in team projects with industry partners, and work experience. Students also have the opportunity to

Comment [SF7]: The existing ‘marketing’ text on P&C is nonsense and embarrassing. It was never approved by us and needs to be replaced.
Also – where do we present the rational for the degree’s existence
develop their innovation and entrepreneurial capabilities by working on their own start-ups with industry entrepreneurs as part of their degree.

Study requirements and Orders

- Provide requirements for the completion of this Award.
- New courses must be approved before being entered into requirements.
- For Vertical Double Degree undergraduate plans and Double Masters Degrees, provide full requirements for the double degree (i.e. both Awards).
- Orders will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean to then be made by the Deputy Vice-Chancellor (Academic) (see Undergraduate Awards Rules and Graduate Awards Rules).
- This section is published on the ‘Programs and Courses’ website to an external audience.

The Bachelor of Software Engineering (Honours) requires completion of 192 units, of which:

- A maximum of 60 units may come from completion of 1000-level courses

The 192 units must include:

108 units from the completion of the following compulsory courses:

- COMP1100 PROG 1
- COMP1110 PROG 2
- COMP16xx Foundations of Computer Science
- COMP2100 PROG 3
- COMP2300 ARCH 1
- COMP2310 ARCH 2
- COMP2130 SOFT ENG
- COMP24xx Introduction to Data Management, Analysis and Security
- COMP3120 Managing Software Development
- COMP3530 Systems Engineering for Software Engineers
- COMP3500 [Software Engineering Practice 1]
- COMP3600 Algorithms
- COMP4xxx Research Methods
- COMP4130 Managing Software Quality and Process
- COMP4800 Industry Experience
- ENGN1211 Discovering Engineering
- ENGN3230 Engineering Innovation
- MATH1005 Discrete Mathematical Models

24 units from either:

- 12 units from completion of COMP4500 Software Engineering Practice 2, and
- 12 units of 4000 level COMP courses

Or:

- 24 units from completion of COMP4540 Software Engineering Research Project

A further 6 units from completion of a COMP course

A further 6 units from completion of courses from the following:

- 3000 or 4000 level COMP courses
- VCUG3001 Unravelling Complexity
VCUG3002 Mobilising Research

48 units from the completion of elective courses offered by the ANU

Learning outcomes

- Learning outcomes are high-level statements of the skills and knowledge which ANU certifies that all graduates of the Award possess.
- For Vertical Double Degrees and Double Masters Degrees, provide full learning outcomes for both degrees.
- This section is published on the ‘Programs and Courses’ website to an external audience.

Upon successful completion, students will be able to:

- define and analyse complex problems, and design, implement and evaluate solutions that demonstrate an understanding of the systems context in which software is developed and operated including economic, social, historical, sustainability and ethical aspects.
- recognise connections and recurring themes, including abstraction and complexity, across the discipline
- adapt to new environments and technologies, and to innovate
- demonstrate an operational understanding of systems engineering and the foundations of computer science including programming, algorithms, logic, architectures and data structures
- apply an advanced understanding of software engineering practices in requirements engineering, system level architecture, data management, security, design, construction, evaluation, and project management.
- communicate complex concepts effectively with diverse audiences using a range of modalities
- lead and work effectively within multi-disciplinary, multi-cultural and distributed teams in order to achieve a common goal
- demonstrate commitment to professional conduct and development that recognises the social, legal and ethical implications of their work, to work independently, and self- and peer-assess performance.
- demonstrate an understanding of the fundamentals of research methodologies, including defining research problems, background reading and literature review, designing experiments, and effectively communicating results.
- apply research methods to the solution of contemporary research problems in software engineering.

Admission requirements

Undergraduate

- ATAR, QLD Band and International Baccalaureate score.
- Include any other requirements, such as current ‘Working with Vulnerable People’ check, successful medical check, etc.
- Include secondary schooling prerequisites
This section is published on the ‘Programs and Courses’ website to an external audience.

Honours plans (without specialisations)

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete numbered items if not required. Note: Item 1 is not required if the degree name is specified.
- Choose only one option from a, b or c.
- A maximum of 12 courses may be specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:

1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in cognate disciplines, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. with at least:
   a. courses in the subject area [with at least 3000-level courses or equivalent].
   b. a [major][minor][specialisation] or equivalent in ____.
   c. with the following courses or equivalent:
4. with the written approval of an identified supervisor for the research project
   with the written approval of an identified supervisor for the thesis

Honours plans (with specialisations)

- Complete the template below only if the admission requirements are being amended
- Delete text in brackets if not required.
- Delete Item 1 if the degree name is specified.

An AQF Level 7 Bachelor [of discipline] degree or equivalent, completed within the last two years:

1. in a cognate discipline
2. with a weighted average mark equivalent to an ANU 70 per cent calculated from the 36 units (i.e. 0.75 EFTSL) of courses in the discipline cognate to the honours specialisation, excluding 1000-level courses (i.e. introductory undergraduate courses), with the highest marks.
3. and the satisfaction of any further requirements specified in the relevant honours specialisation.

Direct-entry Graduate Coursework

- Complete the template below only if the admission requirements are being amended
- Final admission requirements will be drafted by the Academic Standards and Quality Office for confirmation of the appropriate ANU College Associate Dean.
- This section is published on the ‘Programs and Courses’ website to an external audience.

A Bachelor degree or international equivalent

- with an average mark of at least 41T [Delete if not required]
- with at least 41T courses in the field of 41T [Delete if not required]
- with at least 41T years’ work experience in 41T [Delete if not required]
- with the approval of an identified supervisor for the research project/thesis. [Delete if not required]
- with a successful assessment of a portfolio of works. [Delete if not required]
- with a successful audition. [Delete if not required]
- with a 41T [Delete if not required]
Amendment to Academic Award

Cognate disciplines (Honours and Graduate coursework only)

- List each discipline considered to be ‘cognate’ for the purposes of admission and credit on a new line.
- This section is published on the ‘Programs and Courses’ website to an external audience.

41T

Delivery

Current delivery mode(s):

New delivery mode(s) if changing:

- Will now include compulsory work-based training of 41T hours per week for 41T weeks.
- No longer includes compulsory work-based training
- Will now be off campus – this Award is now to be administered and completed externally to the Acton campus.
- No longer off campus – this Award is now to be administered and completed at the Acton campus.
- Will now be Intensive – this Award is now to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.
  Intensive duration in weeks (from commencement to submission of final assessment): 41T
- No longer intensive – this Award is no longer to be completed by undertaking accelerated courses, i.e. courses that are undertaken in a full-time block rather than across a semester.
- Will now be registered on CRICOS (subject to assessment by TEQSA).
- No longer to be registered on CRICOS.

List all teaching periods in which students may commence study.

- i.e. Summer, First Semester, Autumn, Winter, Second Semester and/or Spring
- Note that international student visa holders must be able to complete within the normal duration of study without the need to ‘underload’ or take leave.

First Semester, Second Semester

International student visa holders are able to complete within the normal duration of study without the need to ‘underload’ or take leave when commencing in all listed teaching periods.

ANU Graduate Coursework model (Graduate Coursework only)

- This Award is consistent with the University’s Graduate Coursework Model
- This Award requires approval as an exception to the ANU Graduate Coursework model.
  - For low-enrolment Graduate Certificates and Graduate Diplomas, provide a strategic case for retention of this Award and attach all available evidence.
  - For Masters Degrees requiring more or less than 96 units, or with admission requirements other than a non-cognate Bachelor Degree, provide significant justification for creation of this Award (e.g. professional accreditation or international standards) and attach all available evidence.
Assessment alignment (Bachelor Honours Degrees only)

- If the learning outcomes are being amended, provide an explanation of how the structure of assessment determines whether the Honours learning outcomes have been met.

The Engineering degrees at ANU are embedded honours 4 year programs. There is no distinct honours year but the program includes at least 48 units of AQF8 courses.

The learning outcomes of core courses have been designed to ensure that all graduates demonstrate competencies required by the accrediting authority, Engineers Australia, for honours level engineering degrees.

The Honours Mark is a weighted average percentage mark (APM) calculated by first calculating the average mark for 1000, 2000, 3000 and 4000 level courses. We denote these averages: A1, A2, A3, and A4 respectively. The averages are computed based on all units counted towards satisfaction of degree requirements, excluding non-COMP electives. Finally these averages are combined using the formula:

\[
APM = (0.1 \times A1) + (0.2 \times A2) + (0.3 \times A3) + (0.4 \times A4).
\]

The APM will then be used to determine the final grade according to the ANU Honours grading scale.

Timing of Honours assessment (Bachelor Honours Degrees only)

- If the Study requirements and Orders are being amended, provide an explanation of how either: a minimum of 25% of the assessment which contributes to the final honours grade or; 15% of the assessment which contributes to the final Honours mark and formalised monitoring of progress by staff other than each student’s supervisor or Honours convener is completed in the first half (in terms of duration) of Honours study.

Determination of the Honours grade is as shown above.

Honours research training availability (Bachelor Honours Degrees only)

- If the Study requirements and Orders or the teaching periods in which students may commence study are being amended, and Honours research training courses are to be available to students only once per calendar year, describe the strategies to be used to ensure that students who commence Honours in the Period in which these courses are not taught will not be disadvantaged.

This is an embedded honours degree. Students develop research skills, methods and knowledge as part of the learning activities in five compulsory courses: COMP3120, COMP3500, COMP3530, COMP4130 and ENG3230. All students then undertake a substantial, 12 unit, 2 semester professional practice project or a 24 unit research project under the supervision of a research-active academic, in their final year.

Research component (Masters Degrees only)

- Provide an explanation of and list of courses for how the AQF Level 9 Masters Degree (Coursework) requirement that graduates must be able to “plan and execute a substantial research-based project, capstone experience and/or piece of scholarship” is demonstrated.
Typical full-time pattern of study

Complete fields in this section only if the current details are being changed.

Provide typical full-time patterns of study for each teaching period in which students may commence study.
- Each study pattern should demonstrate completion of the Orders given above in the full-time duration.
- Give the course type, level and unit value in each cell (see Examples below).
- Cells should be merged for courses of 12 or more units.
- Copy and paste rows as needed

First Semester entry

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Type</th>
<th>Course Level</th>
<th>Unit Value</th>
<th>Course Code</th>
<th>Course Type</th>
<th>Course Level</th>
<th>Unit Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>COMP1100/1130 6 units</td>
<td>MATH1005 6 units</td>
<td>ENGN1211 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMP1110/1140 6 units</td>
<td>COMP16xx 6 units</td>
<td>COMP Elective 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 2</td>
<td>COMP2100 6 units</td>
<td>COMP2300 6 units</td>
<td>COMP24xx 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMP3600 6 units</td>
<td>COMP2310 6 units</td>
<td>COMP2130 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td>COMP3500 6 units</td>
<td>COMP3530 6 units</td>
<td>3000 or 4000 level COMP/VC Elective 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMP3500 6 Units</td>
<td>COMP3120 6 units</td>
<td>COMP Research 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 4</td>
<td>COMP4500 6 units</td>
<td>COMP4130 6 units</td>
<td>4000 level COMP Elective 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMP4500 6 units</td>
<td>ENGN3230 6 units</td>
<td>4000 level COMP Elective 6 units</td>
<td>Elective 6 units</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment [SF16]: Does this need a 2000 code?
# Amendment to Academic Award

First Semester entry with PROG 0

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>PROG 0</td>
<td></td>
<td>6 units</td>
<td>MATH1005</td>
<td></td>
<td>6 units</td>
<td>ENGN1211</td>
<td></td>
<td>6 units</td>
</tr>
<tr>
<td></td>
<td>COMP1100/1130</td>
<td></td>
<td>6 units</td>
<td>COMP16xx</td>
<td></td>
<td>6 units</td>
<td>Elective</td>
<td></td>
<td>6 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMP1110/1140</td>
<td></td>
<td>6 units</td>
<td>COMP2300</td>
<td></td>
<td>6 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMP24xx</td>
<td></td>
<td>6 units</td>
<td>Elective</td>
<td></td>
<td>6 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Elective</td>
<td></td>
<td>6 units</td>
<td>Elective</td>
<td></td>
<td>6 units</td>
</tr>
<tr>
<td>Year 2</td>
<td>COMP2100</td>
<td></td>
<td>6 units</td>
<td>COMP3600</td>
<td></td>
<td>6 units</td>
<td>COMP2310</td>
<td></td>
<td>6 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMP2130</td>
<td></td>
<td>6 units</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 3</td>
<td>COMP3500</td>
<td></td>
<td>6 units</td>
<td>COMP3530</td>
<td></td>
<td>6 units</td>
<td>3000 or 4000 level</td>
<td>COMP/VC Elective</td>
<td>6 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMP3120</td>
<td></td>
<td>6 units</td>
<td>COMP Research</td>
<td></td>
<td>6 units</td>
</tr>
<tr>
<td>Year 4</td>
<td>COMP4500</td>
<td></td>
<td>6 units</td>
<td>COMP4130</td>
<td></td>
<td>6 units</td>
<td>4000 level</td>
<td>COMP Elective</td>
<td>6 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ENGN3230</td>
<td></td>
<td>6 units</td>
<td>4000 level</td>
<td>COMP Elective</td>
<td>6 units</td>
</tr>
</tbody>
</table>

---

**Comment [SF17]:** Uses COMP Elective slot

**Comment [SF18]:** Is COMP1110 + COMP2300 concurrently OK? Is by current rules

**Comment [SF19]:** Can COMP2300 be taken before COMP2100 – OK by current rules

**Comment [SF20]:** Does this depend on COMP2100?
## Second Semester entry

<table>
<thead>
<tr>
<th>Year 1</th>
<th>COMP1100/1130 6 units</th>
<th>COMP16xx 6 units</th>
<th>COMP Elective 6 units</th>
<th>Elective 6 units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>COMP1110/1140 6 units</td>
<td>MATH1005 6 units</td>
<td>ENGN1211 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td></td>
<td>COMP2100 6 units</td>
<td>COMP2310 6 units</td>
<td>COMP2130 6 units</td>
<td>COMP3600 6 units</td>
</tr>
<tr>
<td>Year 3</td>
<td>COMP2300 6 units</td>
<td>COMP24xx 6 units</td>
<td>Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td></td>
<td>COMP3500 6 units</td>
<td>COMP3120 6 units</td>
<td>COMP Research 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 4</td>
<td>COMP3500 6 Units</td>
<td>COMP3530 6 units</td>
<td>3000 or 4000 level COMP/VC Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td></td>
<td>COMP4500 6 units</td>
<td>ENGN3230 6 units</td>
<td>4000 level COMP Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
<tr>
<td>Year 5</td>
<td>COMP4500 6 units</td>
<td>COMP4130 6 units</td>
<td>4000 level COMP Elective 6 units</td>
<td>Elective 6 units</td>
</tr>
</tbody>
</table>
### Second Semester entry with PROG 0

<table>
<thead>
<tr>
<th>Year</th>
<th>Course</th>
<th>Units</th>
<th>Course</th>
<th>Units</th>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PROG 0</td>
<td>6</td>
<td>COMP16xx</td>
<td>6</td>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP1100/1130</td>
<td>6</td>
<td>MATH1005</td>
<td>6</td>
<td>ENGN1211</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP1110/1140</td>
<td>6</td>
<td>COMP2310</td>
<td>6</td>
<td><strong>COMP3600</strong></td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>COMP2100</td>
<td>6</td>
<td>COMP2300</td>
<td>6</td>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP3500</td>
<td>6</td>
<td>COMP3120</td>
<td>6</td>
<td>COMP2130</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP3500</td>
<td>6</td>
<td>COMP3530</td>
<td>6</td>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>COMP4500</td>
<td>6</td>
<td>ENGN3230</td>
<td>6</td>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>COMP4500</td>
<td>6</td>
<td>COMP4130</td>
<td>6</td>
<td>Elective</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>COMP3500</td>
<td>6</td>
<td>3000 or 4000 level COMP/VC Elective</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMP4500</td>
<td>6</td>
<td>4000 level COMP Elective</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>COMP4500</td>
<td>6</td>
<td>4000 level COMP Elective</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Fees

Current fee places:

New fee places if changing:

- For Awards adding International Student Fee places, identify an existing Award with the same indicative international student fee (see the annual fee schedule).

41T

- Provide details of additional costs, such as compulsory fieldwork expenses (excludes SA Fee).

41T
Amendment to Academic Award

☐ Consistent with Australian Qualifications Framework, including Level 9 research component where relevant

If not consistent, give details: 41T

☐ Consistent with National Code 2007

If not consistent, give details: 41T

☐ Consistent with policy: Academic Programs and Courses Accreditation

If not consistent, give details: 41T

☐ Consistent with policy: Nomenclature

If not consistent, give details: 41T

☐ Consistent with policy: Structure and Wording of Coursework Award Requirements, including Registrar approval

If not consistent, give details: 41T

☐ Consistent with other relevant University policies and standards (e.g. Admission requirements template)

If not consistent, give details: 41T

Is this becoming the default plan within a single degree program?

☐ Australian Higher Education Graduate Statement is appropriate and accurate

If not appropriate/accurate, provide new AHEGS below (copy and paste for multiple plans as necessary).

Detail of Plan - Australian Higher Education Graduation Statement (AHEGS)

U

Plan Features - Australian Higher Education Graduation Statement (AHEGS)

U

Plan Pathway - Australian Higher Education Graduation Statement (AHEGS)

U

Plan Accreditation - Australian Higher Education Graduation Statement (AHEGS)

U

College Education Committee

Date reviewed by College Education Committee (CEC) 41T

CEC recommendation to UEC

☐ Endorse with no conditions

☐ Endorse with conditions (specified below)

☐ Do not endorse
Amendment to Academic Award

As approved by the Dean or delegated authority on University Education Committee

<table>
<thead>
<tr>
<th>University Education Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date reviewed by University Education Committee (UEC)</td>
</tr>
<tr>
<td>Document Number</td>
</tr>
<tr>
<td>UEC recommendation to Academic Board</td>
</tr>
<tr>
<td>☐ Accredit with no conditions</td>
</tr>
<tr>
<td>☐ Accredit with conditions (specified below)</td>
</tr>
<tr>
<td>☐ Do not accredit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Academic Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date considered by Academic Board</td>
</tr>
<tr>
<td>Document Number</td>
</tr>
<tr>
<td>Academic Board</td>
</tr>
<tr>
<td>☐ Accredits with no conditions from 41T</td>
</tr>
<tr>
<td>☐ Accredits with conditions (specified below) from 41T</td>
</tr>
<tr>
<td>☐ Does not accredit</td>
</tr>
</tbody>
</table>
New Major/Minor/Specialisation

Name: Data Science
Type: 
Responsible College: ANU College of Engineering & Computer Science

Marketing and publication description (Maximum 120 words)

The data science major teaches the principles, theories and skills used in developing methods to collect, manage, analyse, and interpret data in various formats and at a large scale. Students will learn to use a broad range of techniques to extract knowledge and insights from large and complex data, including structured and unstructured data. The program will involve courses in areas such as database systems, data mining, document analysis, artificial intelligence and machine learning.

Learning outcomes

Upon successful completion, students will have the knowledge and skills to:

1. Understand the principles, practice and issues associated with the field of data science
2. Apply a range of data modelling, management, analytics and visualisation techniques to handle structured and unstructured data
3. Understand system infrastructures that support acquisition, storage and retrieval of massive data
4. Identify and solve complex problems in data-intensive applications
5. Communicate effectively on data analytics tasks, techniques and outcomes to diverse audiences

Requirements

- Requirements must not include hurdle/progression requirements.
- Please consider listing as compulsory courses sufficient prerequisites/co-requisites of compulsory courses so that majors, minors and specialisations may be completed within the 24/48 units specified. Where a major, minor or specialisation is exclusive to a particular degree, prerequisites/co-requisites that sit outside the major, minor, or specialisation should be available to students in that degree.
- Graduate specialisations must not refer to subject areas (e.g. LAWS Law) or hurdle/progression requirements.

Completion of 48 units of courses as follows:

24 units from completion of the following courses:
- COMP2400 Relational Databases
- COMP3425 Data Mining
- COMP3430 Data Wrangling
- COMP4650 Document Analysis

24 units from completion of courses from the following:
- COMP3620 Artificial Intelligence
- COMP4460 Bio-inspired Computing: Applications and Interfaces
- COMP4470 Statistical Machine Learning
- COMP4620 Advanced Artificial Intelligence
- COMP4680 Advanced Statistical Machine Learning

Co-requisite major(s) (specialisation only)
- Undergraduate specialisations require at least one co-requisite major.
New Major/Minor/Specialisation

41T

Exclusivity

- If this major, minor or specialisation is restricted to particular Awards (i.e. may not be completed with electives in all undergraduate Awards), list them below. Copy/paste additional rows as required.

<table>
<thead>
<tr>
<th>Academic plan</th>
<th>Award name</th>
</tr>
</thead>
<tbody>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
</tbody>
</table>

Endorsement, approval and accreditation

College

by 41T on 41T

University Education Committee

on 41T

Academic Board

on 41T

Academic Standards and Quality Office use only

Subplan code: 41T
New Major/Minor/Specialisation

Name: Intelligent Systems
Type: 
Responsible College: ANU College of Engineering & Computer Science

Marketing and publication description (Maximum 120 words)

Artificial Intelligence is one of the most fascinating scientific disciplines and one that will probably have the biggest impact on our society over the next 50 years. Intelligent Systems (IS) are increasingly entering our lives - we benefit from it particularly through our smart phones and experiences on the Internet. Self-driving cars and household robots could also be standard technologies very soon. Intelligent Systems approach and exceed human intellectual capabilities in an increasing number of domains (expert systems, board games such as Chess and Go, speech recognition and translation, process optimization, search engines), some can autonomously deal with unknown and unexpected situations. Indeed, Intelligent Systems have the potential to be deployed in almost any facet of our lives. The Intelligent Systems specialization offers courses on a wide range of relevant topics.

Learning outcomes

Upon successful completion, students will be able to:

1. Demonstrate a solid understanding of a variety of Intelligence System (IS) approaches,
2. Identify which IS methods may be suitable to solving a given problem and how to formalize them.
3. Implement IS algorithms and design and carry out empirical evaluations.

Depending on the chosen courses, students will learn about AI search, optimisation, knowledge representation, reasoning, planning, diagnosis, machine learning, document analysis, intelligent agents (reinforcement learning, information-theoretic foundations), data-driven approaches (mining, matching, wrangling, modelling), and bio-inspired computing (neural networks, evolutionary algorithms, human brain&mind).

Requirements

- Requirements must not include hurdle/progression requirements.
- Please consider listing as compulsory courses sufficient prerequisites/co-requisites of compulsory courses so that majors, minors and specialisations may be completed within the 24/48 units specified. Where a major, minor or specialisation is exclusive to a particular degree, prerequisites/co-requisites that sit outside the major, minor, or specialisation should be available to students in that degree.
- Graduate specialisations must not refer to subject areas (e.g. LAWS Law) or hurdle/progression requirements.

Completion of 24 units of courses from the following, including at least 12 units of 4000-level courses:

- COMP3425 Data Mining
- COMP3430 Data Wrangling
- COMP3620 Artificial Intelligence
- COMP3650 System Architectural Understanding and the Human Brain
- COMP4620 Advanced Artificial Intelligence
- COMP4650 Document Analysis
- COMP4660 Bio-Inspired Computing
- COMP4670 Statistical Machine Learning
- COMP4680 Advanced Statistical Machine Learning
Co-requisite major(s) (specialisation only)
- Undergraduate specialisations require at least one co-requisite major.

Exclusivity
- If this major, minor or specialisation is restricted to particular Awards (i.e. may not be completed with electives in all undergraduate Awards), list them below. Copy/paste additional rows as required.

<table>
<thead>
<tr>
<th>Academic plan</th>
<th>Award name</th>
</tr>
</thead>
<tbody>
<tr>
<td>41T</td>
<td>Bachelor of Advanced Computing (Honours)</td>
</tr>
<tr>
<td>41T</td>
<td>Bachelor of Advanced Computing (R&amp;D) (Honours)</td>
</tr>
<tr>
<td>41T</td>
<td>Bachelor of Software Engineering (Honours)</td>
</tr>
<tr>
<td>41T</td>
<td></td>
</tr>
</tbody>
</table>

Endorsement, approval and accreditation

College  
by 41T on 41T

University Education Committee  
on 41T

Academic Board  
on 41T

Academic Standards and Quality Office use only

Subplan code: 41T
Theoretical Computer Science

Learning Outcomes

On completing the specialisation in Theoretical Computer Science students will be able to:

• Describe and explain key concepts of algorithm design, formal models of computation and complexity theory
• Expertly apply techniques of logic, information theory and finite mathematics to the analysis of algorithms
• Think critically and assimilate information from different disciplines in order to solve problems related to computer science
• Evaluate and critically analyse scientific literature to extend their knowledge in the field.
• Communicate and present their knowledge of computer science clearly to diverse audiences.

Requirements

Completion of 24 units of courses from the following, including at least 12 units of 4000-level courses:

• COMP2610 Information Theory
• COMP2620 Logic
• COMP3630 Theory of Computation
• COMP4600 Advanced Algorithms
• COMP4630 Overview of Logic and Computation
Computer Systems Major

Description

Computers have transformed our society in many ways, from applications that enable us to video conference across the globe, to the ability to access and share information via the Internet, to the way drugs are designed using computer applications for simulation and modelling. Computer Systems have provided the software foundations upon which these applications run. As we push the limits of what can be done, these foundations are also strained and pushed to their limits. This major focuses on the computer systems that provide this critical resource. The major explores topics such as operating systems, networks, concurrency, electronics, embedded systems, and high performance computing.

Learning outcomes

Upon successful completion, students will be able to:

- demonstrate a solid understanding of a variety of computer system approaches,
- identify which computer system methods may be suitable for solving a given problem and how to describe them, and
- design, implement, test, and evaluate different computer system approaches.

Depending on the chosen courses, students will learn about: concurrency and the design and implementation of concurrent programs; synchronisation approaches; operating system design; memory management; process scheduling; files systems; network layers and protocols including datalink, network, and transport layer protocols and their performance; modelling and simulation and the limitations and design of such systems; numerical calculation; developing algorithms and implementing code that yields good performance on high-performance architectures; designing the electronic circuits that form the building block of modern computers; designing complex digital systems such as Finite State Machines; and programming microprocessors and FPGAs.

Requirements

Completion of 48 units of courses as follows:

24 units from completion of the following courses:

- COMP2310 Concurrent and Distributed Systems
- COMP3300 Operating Systems Implementation
- COMP3310 Computer Networks
- ENGN3213 Digital Systems and Microprocessors

24 units from completion of the following course(s):

- COMP3320 High Performance Scientific Computation
- COMP3610 Principles of Programming Languages
- COMP4300 Parallel Systems
- COMP4330 Real-Time & Embedded Systems
- COMP4340 Multicore Computing: Principles and Practice
- ENGN1218 Introduction to Electronics
- ENGN2218 Electronic Systems and Design

Changes from previous requirements

This major is a modification of the Computer Engineering major. So the name has been changed to better reflect the content of the major and research focus of our school. COMP2300 Introduction to Computer Systems has been removed from the core of this major as it has moved into the core of our renewed degree programs, so students doing this major would still complete COMP2300. ENGN3226 Digital Communications and ENGN4536 Wireless Communications have been remove as they don’t have a strong focus on the computer system aspects of these topics.

Transition arrangements

The main transition arrangement is to start offering COMP3300 and COMP3310 every year. This is because they are now required courses for the major and students doing the BIT will generally only have the background for these courses in there final 2 semester of study. Although offering these courses every year does not need to start until 2018.

Comments (not to be included in application form)

Another approach (if the school is not willing to run COMP3300/3310 every year) would be to have COMP2310 and ENGN3213 as the only requirements and then 36 units made up of the rest of the list. If we took this approach we would need to alternate COMP3300 and COMP3310 (so move one of these courses to an odd year).
Systems and Architecture

Computer systems and computer system architectures provide critical resources for modern computing environments. This ranges from resources for generally purpose user application programming, to highly specialised real time embedded development environments. By gaining a deep understanding of these systems a developer can produce robust and high performing implementations. Gaining such and understanding also facilitates the exploration of better ways of providing these fundamental resources. This specialisation focuses on computer systems including their use, architecture, design, implementation, and limitations.

Learning Outcomes

Upon successful completion, students will be able to:

- demonstrate a deep understanding of a variety of computer systems and approaches,
- identify which computer system methods and computer systems architectures may be suitable for solving a given problem and how to describe them, and
- design, implement, test, and evaluate different computer system approaches.

Depending on the chosen courses, students will learn about: concurrency and the design and implementation of concurrent programs; synchronisation approaches; operating system design; memory management; process scheduling; files systems; network layers and protocols including datalink, network, and transport layer protocols and their performance; modelling and simulation and the limitations and design of such systems; numerical calculation; developing algorithms and implementing code that yields good performance on high-performance architectures; database design methods; database query processing and optimization; and transaction and security management in a relational database management system.

Requirements

Completion of 24 units of courses from the following, including at least 12 units of 4000-level courses:

- COMP2400 Relational Databases
- COMP3300 Operating Systems Implementation
- COMP3310 Computer Networks
- COMP3320 High Performance Scientific Computation
- COMP3610 Principles of Programming Languages
- COMP4300 Parallel Systems
- COMP4330 Real-Time and Embedded Systems
- COMP4340 Multicore Computing: Principles and Practice

Changes from previous requirements

The name has changed form “Computer Systems” to “Systems and Architecture”. There has also been the addition of COMP2400 Relational Databases. Databases provide a computing resource upon which other programs are development, as such it is a low level computer system resources and may be included into this specialisation.

Transition arrangements

Given such a small change there is no required transition arrangements.
New Major/Minor/Specialisation

Name: Software Development
Type: Major - 48 units
Responsible College: ANU College of Engineering & Computer Science

Marketing and publication description (Maximum 120 words)

The Software Development major integrates the conceptual and practical skills related to the technology of computer systems used in the creation of high quality software. Students develop the knowledge and skills needed to build software based solutions to complex problems in ICT, as well as understanding the systems context within which software is developed and operated, preparing them for a professional career in the ICT industry.

Learning outcomes

Upon successful completion, students will have the knowledge and skills to:

1. Understand the holistic and multi-disciplinary nature of complex engineering projects and apply that knowledge when analysing, designing, implementing and evaluating software solutions.
2. Creatively identify, analyse, design, implement and evaluate appropriate solutions to complex problems that exist within the domain of ICT.
3. Make and defend sound engineering decisions.
4. Work as an effective member of a team to implement software based solutions that deliver measurable value to industry or university clients.
5. Demonstrate through application, knowledge of key project management skills.
6. Communicate efficiently and effectively with their peers and a range of project stakeholders across a variety of domains.

Requirements

- Requirements must not include hurdle/progression requirements.
- Please consider listing as compulsory courses sufficient prerequisites/co-requisites of compulsory courses so that majors, minors and specialisations may be completed within the 24/48 units specified. Where a major, minor or specialisation is exclusive to a particular degree, prerequisites/co-requisites that sit outside the major, minor, or specialisation should be available to students in that degree.
- Graduate specialisations must not refer to subject areas (e.g. LAWS Law) or hurdle/progression requirements.

Completion of 48 units of courses as follows:

- COMP2130 Software Analysis and Design
- COMP2310 Concurrent and Distributed Systems
- COMP3100 Software Engineering Group Project (12u)
- COMP3120 Managing Software Development
- COMP3530 Systems Engineering for Software Engineers
- COMP3600 Algorithms
- One from the following:
  - COMP3610 Principles of Programming Languages
  - COMP4130 Managing Software Quality and Process
  - COMP4600 Advanced Algorithms

Co-requisite major(s) (specialisation only)
• Undergraduate specialisations require at least one co-requisite major.

41T

Exclusivity
• If this major, minor or specialisation is restricted to particular Awards (i.e. may not be completed with electives in all undergraduate Awards), list them below. Copy/paste additional rows as required.

<table>
<thead>
<tr>
<th>Academic plan</th>
<th>Award name</th>
</tr>
</thead>
<tbody>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
</tbody>
</table>

Endorsement, approval and accreditation

College
by 41T on 41T

University Education Committee
on 41T

Academic Board
on 41T

Academic Standards and Quality Office use only

Subplan code: 41T
New Major/Minor/Specialisation

Name: Information Systems
Type: Major - 48 units
Responsible College: ANU College of Engineering & Computer Science

Marketing and publication description (Maximum 120 words)

The Information Systems major integrates conceptual and practical skills related to the creation, flow and usage of information within organisations. Students develop an understanding of organisations, and the knowledge and skills required for systems analysis and design, and to manage organisational computer systems applications, preparing them to pursue a professional career in the Information Technology industry.

Learning outcomes

Upon successful completion, students will have the knowledge and skills to:

1. Understand the holistic and multi-disciplinary nature of complex information systems projects and apply that knowledge when analysing, designing and evaluating solutions.
2. Creatively identify, analyse, design and evaluate appropriate solutions to complex problems that exist within the domain of Information Systems.
3. Demonstrate through application key project management skills and knowledge used within information systems projects.
4. Communicate efficiently and effectively using a range of modalities.

Requirements

- Requirements must not include hurdle/progression requirements.
- Please consider listing as compulsory courses sufficient prerequisites/co-requisites of compulsory courses so that majors, minors and specialisations may be completed within the 24/48 units specified. Where a major, minor or specialisation is exclusive to a particular degree, prerequisites/co-requisites that sit outside the major, minor, or specialisation should be available to students in that degree.
- Graduate specialisations must not refer to subject areas (e.g. LAWS Law) or hurdle/progression requirements.

Completion of 48 units of courses as follows:

- COMP2130 Software Analysis and Design
- COMP2400 Relational Databases
- COMP2410 Networked Information Systems
- INFS1001 Business Information Systems
- INFS2024 Information Systems Analysis
- INFS3024 Information Systems Management
- INFS3059 Project Management and Information Systems
- One from the following:
  - COMP3900 Human Computer Interface Design and Evaluation
  - COMP4650 Document Analysis
  - INFS3002 Enterprise Systems in Business

Co-requisite major(s) (specialisation only)

- Undergraduate specialisations require at least one co-requisite major.
New Major/Minor/Specialisation

41T

Exclusivity
- If this major, minor or specialisation is restricted to particular Awards (i.e. may not be completed with electives in all undergraduate Awards), list them below. Copy/paste additional rows as required.

<table>
<thead>
<tr>
<th>Academic plan</th>
<th>Award name</th>
</tr>
</thead>
<tbody>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
<tr>
<td>41T</td>
<td>41T</td>
</tr>
</tbody>
</table>

Endorsement, approval and accreditation

College
by 41T on 41T

University Education Committee
on 41T

Academic Board
on 41T

Academic Standards and Quality Office use only

Subplan code: 41T
Introduction to Data Management, Analysis and Security

ACM/IEEE Topics Covered

1. Information Management
   1. IM/Information Management Concepts
   2. IM/Database Systems
   3. IM/Data Modeling
   4. IM/Indexing
   5. IM/Relational Databases
   6. IM/Query Languages
   7. IM/Data Mining

2. Intelligent Systems
   1. IS/Fundamental Issues
   2. IS/Basic Search Strategies
   3. IS/Basic Knowledge Representation and Reasoning
   4. IS/Basic Machine Learning

3. Security
   1. IAS/Foundational Concepts in Security
   2. IAS/Network Security (Use of crypto for data security)
   3. IAS/Cryptography
   4. IAS/Security Policy and Governance? (Elective)

Course title

In our opinion, the course title should be a faithful yet succinct summary of the course content, and level of coverage. It will be used by students to choose a course, and shown in transcripts in years to come.

On one hand, the subject of data science is timely and we anticipate significant demand from students within CS and from other degree programs. However, we have surveyed data science course offerings across the world, and do not see one single course covering system security in its syllabus.

On the other hand, the title “data science” does not accurately reflect the intended course content, since the intended course content related to security is significant in volume, and needs to be reflected in the title.

There is an apparent tension between ‘data science’ and ‘data and security’, we think this should be treated very carefully. If we call a course ‘data science’ (and it seems we should), then it should deliver content aligned with what domain experts and industry deem as ‘data science’.

Course description

Commerce and research are being transformed by data-driven discovery and prediction. Skills required for data analytics at massive levels – scalable data management on and off the cloud, parallel algorithms, statistical modeling, and proficiency with a complex ecosystem of tools and platforms – span a variety of disciplines and are not easy to obtain through conventional curricula. Tour the basic techniques of data science, including both SQL and NoSQL solutions for massive data management, basic statistical modeling (e.g., descriptive statistics, linear and non-linear regression), algorithms for machine learning and optimization, and fundamentals of knowledge representation and search. Learn key concepts in security and the use of cryptographic techniques in securing data.
Learning outcomes

1. Understand the basic concepts of database systems and architecture
2. Have basic knowledge of data models and declarative query languages
3. Be able to define, query and manipulate a relational database
4. Possess basic knowledge of descriptive data analysis methods
5. Possess basic knowledge of predictive data analysis methods
6. Possess basic knowledge of optimization and search
7. Have encountered and understood examples of knowledge representation
8. Able to formulate and extract descriptive and predictive statistics from data
9. Analyze and interpret results from descriptive and predictive data analysis
10. Apply their knowledge to a given problem domain, articulate potential data analysis problems
11. Identify potential pitfalls, social and ethical implications of data science
12. Describe the key concepts in security
13. Explain the use of cryptographic techniques in data security
14. Explain how PKI supports digital signatures and encryption

Indicative assignment

Assignments 50% (4 or 5 programming+written assignments, one for each section); Final exam 50%
for Information management/database systems, assignment 25% (SQL lab assignment+written assignment, which cover the topics in the first three weeks) final exam 25%
for machine learning/data science, assignments 50% (4 or 5 programming+written assignments, one for each section) final exam 50%
for security: some questions in the final exam.

Recommended text book

Given that this is the 2000 level course, it is importent to have a lucid and coherently-written textbook for student reading, the book should also covers the vast majority of the course content (80%). There are a number of good data science books emerging.
However, to the best of our knowledge, a book that covers the traditionally distinct topics of data and security does not exist.

Draft Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Information management / database systems</em></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Database system concepts and architecture</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Data models (a general introduction to data models with an emphasis on the relational data model)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SQL (define, manage and query relational databases) (Indexing will be introduced in the context of SQL, and covered by several slides in Week 3)</td>
<td>Assignment 1</td>
</tr>
<tr>
<td></td>
<td><em>Data science, machine learning and optimization</em></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Understanding and describing data, statistical data description, from data to insights, statistical tools</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Machine learning fundamentals</td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>Topics</td>
<td>Assessment</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>6</td>
<td>Linear models and its direct extensions</td>
<td>Assignment 2</td>
</tr>
<tr>
<td>7</td>
<td>Unsupervised learning, clustering</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Optimization and search</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Web data, knowledge representation, and search engine primary</td>
<td>Assignment 3</td>
</tr>
<tr>
<td>10</td>
<td>Data science in the real-world design of experiments,</td>
<td>Assignment 4</td>
</tr>
<tr>
<td></td>
<td>social context of data science</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Security</strong></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Key security properties (CIA), Risks/Threats/Vulnerabilities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Authentication/access control/Trust, Ethics</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Data encryption techniques, digital signatures, pki</td>
<td>Assignment 5</td>
</tr>
</tbody>
</table>

**Relationship to existing courses**

- **COMP2400 (Relational Databases):** The intended data science course will cover the lectures in the first three weeks of COMP2400 (about 25% overlap). This would accordingly free 2-3 weeks from COMP2400 allowing to extend COMP2400 with more advanced topics of database systems. In such case, COMP2400 needs to be changed (with a title like “Database Systems” and being an elective course at the 3000 level).

  (For students from CBE, they will have difficulty to undertake the course COMP2400 if changed, unless they do this new course data & security first or have basic knowledge about relational databases from somewhere else).

- **COMP3420 (Advanced Databases and Data Mining):** This course will be cancelled. The intended data science course will have 25% overlap with existing COMP3420.

- **COMP3425 (Data Mining) & COMP3430 (Data Wrangling):** We have checked with Peter Christen, and he indicated that all the content from Week 4 to Week 10 would be covered to some degree in COMP3425&COMP3430.
Individual Research Project

This is an Individual Research Project (IRP) within the Bachelor of Advanced Computing (Research and Development) (Honours) degree. Students do multiple IRPs during their degree studies, each specifically designed to provide a strong research focus customised to each student. These give students valuable research experience along with the opportunity to explore different research areas prior to their final honour project.

Students will conduct an IRP under the close supervision of one or more academic staff. Projects will, at least in part, require the application of theoretical or experimental research techniques. Students will prepare a report on the research project and its outcomes. They will also be expected to present a short seminar describing their work.

Learning Outcomes

Learning Outcomes will be determined for each individual student and recorded in an ‘Independent Study Contract’ at the beginning of the course. However, in general, on satisfying the requirements of this course students will have the knowledge and skills to:

- plan and engage in an independent and sustained critical investigation and evaluation of a chosen computer science research topic,
- engage in systematic discovery and critical review of appropriate and relevant information sources,
- propose, develop and evaluate different approaches for solving a research problem, and
- communicate research concepts and contexts clearly and effectively both in writing and orally.

Workload

Students are expected to spend 10-12 hours each week on this course. Contact hours will be determined for each individual student and recorded in an ‘Independent Study Contract’ at the beginning of the course.

Indicative Assessment

An appropriate combination of written report, artefact, and seminar presentations. This will be set out in the ‘Independent Study Contract’ for each student at the start of each course.

Requisite and Incompatibility

To enrol in this course you must be studying the Bachelor of Advanced Computing (Research and Development) (Honours) program. Also you need to find a project/supervisor and complete the ‘Independent Study Contract’ to obtain a permission code to enrol into this course. This is best done before the start of the semester you are intending to do this course.
Request Type: New Course

Amendment Type: Please select Amendment Type

Amendment Description: New Course

Rationale:

Long Course Title: Individual Computing Project

Short Course Title:

ACADEMIC USE

To Take Effect From: 01/01/2017

Course Minimum Unit Value: 6

Course Maximum Unit Value: 12

Does this course have an UG / PG Equivalent?: No

Do you want this course to be offered as a variable unit course?: No

Proposer Name: Ramesh Sankaranarayana

Primary Convenor's Email: Weifa.liang@anu.edu.au

Primary Convenor's Name: Weifa Liang

Course Description:
This 12 unit single semester course acts as a capstone to the Master of Computing and requires students to complete a practical project on an appropriate computing topic. They will be expected to carry out some combination of reading, writing, artefact construction and presentation whilst working under supervision. The nature of the project can be theoretic, experimental, design or development based on the interests of available supervisors and the student.

Course Structure and Content:
Students will prepare a research report on the project and its outcomes and also will be expected to present a poster and a short seminar describing their work. Individual specific learning objectives, project overview and assessment arrangements will be specified at the outset of the project using the Research School of Computer Science 'Independent Study Contract' form. Students will be expected to apply their computing knowledge and skills in the planning and execution of their project.

Learning Outcomes:
On completion of this course, students will be able to:
- apply their computing knowledge and implementation skills to a specific topic area in computing
- explain how they have extended and deepened their knowledge of computing principles, technical skills and practice through undertaking the project
- demonstrate advanced skills in oral and written communication
- demonstrate through successful completion of the project, relevant project-related skills, including project planning and management, ethics, evaluation and production of project artefacts
### Workload

Approximately 8 x one-hour meetings and 260 hours of individual project work.

### Prescribed Texts (Reading to Support the Course)

- 

### Preliminary Reading

- 

### Indicative Reading List

- 

### Assumed Knowledge, Required Skills and Recommended Courses (not prerequisites)

- To enrol in this course students must be enrolled in the Master of Computing (MCOMP) and have completed COMP8260 Professional Practice II and COMP6442 Software Construction (For more information please refer Requisite Design Guide)

### Requisite Statement for Course (includes Corequisite/Prerequisite and Incompatibility)

- 

### Indicative Assessment

Oral Presentation (10%), Project Artifacts (30%) and Report (60%)

### Assessment Rationale

- 

### Additional Assessment | Learning Outcomes

- 

### Mode of Delivery

In person

### Quality Assurance Arrangements

- 

### Transitional Arrangements (if applicable)

- 

### Relevant ANU internal and external consultation

- 

### Intended Market and work undertaken to evaluate the market

- 

### Estimated Enrolment Numbers and rationale

- 

### Areas of Interest

Please select Areas of Interest

### Is this required on a Sub-Plan?

Please specify Major / Minor / Spec

---

**ADMINISTRATION USE**

- **Responsible College**: ANU College of Engineering and Computer Science
- **Send Notifications To**: 
- **Associate Dean / Dean/ College Dean**: Associate Professor Jochen Trumpf
- **Is Consent Required to Enrol?**: Yes
If yes, reason
Prior to enrolment, students must have a supervisor, and a completed and signed Individual Study Contract form.

Eligibility for Graduate Studies (Graduate Coursework Only)
No

Graduate Studies Classification 1

Graduate Studies Classification 2

List of course topics (Topics are descriptors on course names) (30 character limit each topic)

Academic Organisation (Offered by)
07345 – Research School of Computer Science

Academic Group
ENGIT (ANU College of Eng & Comp Sci)

Academic Career

How many times may this course be repeated after successful completion?
0

(Please enter number only)

Course Grading Basis

Course Component
(Work Experience course are where student learning and performance is not directed by the university)

Is this a work experience or course internship?
No

If yes, to a work experience course, will the learning and assessment be directed by the ANU?

Quota

Proposed Scheduling (for the next three years)
Offered in both first and second semesters 2017, 2018, 2019

Does this course have more than one owner?
No

<table>
<thead>
<tr>
<th>Split Ownership</th>
<th>Academic Organisation</th>
<th>Percentage EFTSL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COURSE FEES

Field of Education Code

<table>
<thead>
<tr>
<th>Year</th>
<th>Per Unit ISF</th>
<th>Per Unit DTF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fee rate is same as existing course

Department ID
CE200

Submit by Email to Course Registry
PROG1: Introduction to Computer Science —
Programming as Problem Solving

Course Description

Write a narrative description, as per the format on programsandcourses.

This course is the first of three core computer science courses on programming. It introduces students to the field of computer science as a discipline for solving problems through computation and provides the foundation for more advanced courses on programming and software development. Data structures and algorithms, the key concepts at the core of computer science, receive their first treatment in this course. The course addresses both functional and imperative programming paradigms.

The course covers functional programming in depth, developing the core idea of functions operating on data structures. Students learn the organization of programming languages using types, how programs are evaluated (reduction), functional composition, recursive functions, algebraic data types, pattern matching, structural recursion/induction, introduction to asymptotic analysis of basic data structures, parametric polymorphism, higher-order functions, abstract data types, modules, laziness, and streams. The functional paradigm demonstrates elegant solutions to many programming problems.

The course also introduces imperative programming as an alternative paradigm to functional programming, highlighting similarities and contrasting differences. Students learn the basic ingredients of imperative programs: mutable variables, sequencing, conditionals, iteration, functions, eager evaluation, and side effects.

The course also introduces students to standard productivity tools for software development that will be used throughout the course and remainder of the computer science degree. These include distributed software revision control systems.
Course Breakdown by Week (PROG1)

The schedule should roughly reflect the knowledge areas which are addressed above. An indication how assessment items and lab activities are synchronize with the course content is also useful.

<table>
<thead>
<tr>
<th>Week</th>
<th>Content</th>
<th>Lab Activities</th>
<th>Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Graduate Attributes (PROG1)

For each of the graduate attributes, state what contributions (if any) this course makes to achieving that graduate attribute or in which way the course supports or enhances any of those graduate attributes.

<table>
<thead>
<tr>
<th>Graduate Attribute</th>
<th>Addressed</th>
<th>Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA1</td>
<td>partly</td>
<td>Portrays computing as a problem solving discipline from the very first lecture and throughout the course.</td>
</tr>
<tr>
<td>GA2.1-2.3</td>
<td>2.1, 2.2</td>
<td>Lays the programming foundations on which all further programming courses will build, and provides necessary understanding for extending these to develop new technologies in later courses.</td>
</tr>
<tr>
<td>GA3</td>
<td>partly</td>
<td>Provides some historical context but addresses only ethical contexts with respect to intellectual property.</td>
</tr>
<tr>
<td>GA4.1-4.3</td>
<td>yes</td>
<td>Covers theoretical foundations of programming, and some algorithms and data structures.</td>
</tr>
<tr>
<td>GA5</td>
<td>partly</td>
<td>Introduces abstraction through both the solving of problems and the development of functional and imperative programming languages.</td>
</tr>
<tr>
<td>GA6.1-6.3</td>
<td>partly</td>
<td>Provides deep understanding of programming and in particular the functional paradigm.</td>
</tr>
<tr>
<td>GA7.1-7.3</td>
<td>partly</td>
<td>Provides foundations but does not tackle analysis and design of complex problems in this course.</td>
</tr>
<tr>
<td>GA8</td>
<td>partly</td>
<td>Students need to communicate clearly in their assignments.</td>
</tr>
<tr>
<td>GA9.1-9.3</td>
<td>no</td>
<td></td>
</tr>
<tr>
<td>GA10</td>
<td>partly</td>
<td>Addresses only intellectual property.</td>
</tr>
<tr>
<td>GA11</td>
<td>yes</td>
<td>Switches between two programming paradigms — functional and imperative.</td>
</tr>
<tr>
<td>GA12.1-12.3</td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>
Course Learning Outcomes (LOs)

Learning outcomes usually start with a verb which indicates the level at which the material is mastered. The levels used here are “familiarity”, “usage”, “assessment” and “innovation”. They refer roughly to “know the terms”, “can apply the concepts”, “can reflect and contrast”, “is able to expand, improve or replace the concepts”.

The learning outcomes in this section are a summary of the knowledge units as claimed above.

Upon completion of this course, the student will be able to:

- Understand basic types and the benefits of static typing [PL/Basic Type Systems: 1-12]
- Distinguish language definition from implementation, syntax and parsing from semantics and evaluation [PL/Language Translation and Execution: 1,2]
- Describe, understand and evolve programs, via documentation, testing, and debugging [SDF/Development Methods: 1,7,8,10,12; SE/Software Verification and Validation: 3,5,6,8]
- Discuss the fundamentals of algorithms and design, and to create, implement, and debug algorithms for solving simple problems, including recursively, using divide-and-conquer, and via decomposition [SDF/Algorithms and Design: 1-9]
- Use and apply fundamental data structures and algorithms [SDF/Fundamental Data Structures: 1,2,7; AL/Fundamental Data Structures and Algorithms: 1,2,3,7]
- Apply basic algorithmic analysis to simple algorithms [AL/Basic Analysis: 1-7]
- Determine appropriate algorithmic approaches to a problem (brute-force, greedy, divide-and-conquer, recursive backtracking, dynamic programming) [AL/Algorithmic Strategies: 1,3,6,7]
- Describe and apply alternative computational paradigms to simple problems [SF/Computational Paradigms: 1-8]
- Understand the legal context for protection of software as intellectual property [SP/Intellectual Property: 1,2,3,5]

Assessment

This section serves two purposes. The indicative assessment is provided to the students via programs and courses, while the rationale for the assessment structure connects the course to the graduate outcomes.

2 Assignments (30%), Lab Assessment (5%), Mid-Term Exam (10%), Final Exam (55%)

The lab assessment and mid-term exam serve as an early check on student progress in this introductory course, to ensure that students are engaging with the material appropriately. Labs and assignments ensure that students are becoming familiar with the new environments and technologies that they need to succeed in this and later courses (GA11 Adaptability). All assessments address GA4 Foundational Knowledge and Skills due to content, GA5 Themes by introducing concepts that they will see again in later courses, GA7 Design via programming as problem solving, and GA8 Communication Skills via assignment reports.
Tools, Languages, Environments and Equipment

This section is purely for internal use and planning of resources for a course. The choice of tools will fluctuate faster than the contents of the course.

Haskell (+ some Python for imperative programming as necessary), gitlab, Linux instructional labs.

Assumed Knowledge, Prerequisites and Corequisites

- Basic mathematics necessary for simple algorithm analysis
- Familiarity with computer systems and ability to run programs and navigate a file system
- No prior programming experience is expected

Comparison of Old versus New

When relating the new course to one or multiple courses from the current curriculum, also identify whether the course has migrated far enough from the current editions that a new name of course code would be required.

Much of the content is currently contained in COMP1100. Exceptions include slightly deeper algorithmic analysis that currently appears only in COMP1130, a more detailed look at computational paradigms, and adoption of SP/IP topics.
SEng1: Software Engineering ????

Course Description

Write a narrative description, as per the format on programsandcourses.

Real-world software development is a dynamically complex activity involving uncertainty, people, technology and processes interacting within a similarly complex environment of clients, users and other stakeholders as well as evolving technological, physical, social, legal, ethical and other constraints.

This course will empower students with the ability and confidence necessary to exercise critical thinking and professional judgment to select and apply appropriate knowledge, practices and tools to the development of non-trivial software systems within such complex environments.

This will be achieved by first introducing students to key ideas and tools for dealing with complexity and uncertainty including Design Thinking. We will then build on previous programming and architecture courses to deepen and broaden student knowledge and understanding of the practices and tools used to build software systems within complex environments. We will use examples of real-time, distributed, web-based, high-integrity, games and other types of projects from local industry, published case studies and past software engineering student projects, to develop an understanding of when and why particular practices and tools are appropriate and when they are not.

Students will also learn how practices and tools can be adapted to suit specific project needs and contexts. Knowledge, practices and tools considered in this course will cover process models, requirements engineering, design, modelling, construction, verification and validation, human-computer interaction, professional ethics, teamwork and social context.

NOTE: While this course covers many learning outcomes, they are all studied using a 'Learn-by-Doing' philosophy within a framework of complexity and examples drawn from real-world projects. This framework and associated learning activities will maintain a clear focus on producing students with the ability and confidence necessary to hit the ground running in team-based project courses such as TechLauncher.

Detailed mapping of ACM/IEEE KU and LOs

See attached spreadsheet ACM_IEEE_SEng1.ods
Graduate Attributes

For each of the graduate attributes, state what contributions (if any) this course makes to achieving that graduate attribute or in which way the course supports or enhances any of those graduate attributes.

The following table is incomplete – need to add SP etc.

<table>
<thead>
<tr>
<th>Graduate Attribute</th>
<th>Addressed</th>
<th>Contributions (Refer attached ACM/IEEE Mapping)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA2.1-2.3</td>
<td>Yes</td>
<td>SE.2.1,3; SE.3.2,4,5; SE.4.1..7; SE.5.3..15; SE.6.4..7; SE.7.1,4,9; SE.8.1,2,4..6; SE.9.1..3</td>
</tr>
<tr>
<td>GA3</td>
<td></td>
<td>Design, abstraction, process and use of professional judgement in decision making are cross cutting concerns in this course</td>
</tr>
<tr>
<td>GA4.1-4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA5</td>
<td>Yes</td>
<td>Design, abstraction, process and use of professional judgement in decision making are cross cutting concerns in this course</td>
</tr>
<tr>
<td>GA6.1-6.3</td>
<td>Yes</td>
<td>SE.4.4..7; SE.5.3..15; SE.6.4..7;SE.7.1,4,9; SE.8.1,2,4..6; SE.9.1..3; Additional Learning Outcomes listed below</td>
</tr>
<tr>
<td>GA7.1-7.3</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>GA8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA9.1-9.3</td>
<td>Yes</td>
<td>SE.2.1,3</td>
</tr>
<tr>
<td>GA10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA11</td>
<td>Yes</td>
<td>Additional Learning Outcomes listed below</td>
</tr>
<tr>
<td>GA12.1-12.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional Learning Outcomes

On completion of the course, students will be able to:
Course Breakdown by Week

The schedule should roughly reflect the knowledge areas which are addressed above. An indication how assessment items and lab activities are synchronize with the course content is also useful.

<table>
<thead>
<tr>
<th>Week</th>
<th>Content</th>
<th>Lab Activities</th>
<th>Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Course Learning Outcomes (LOs)

Learning outcomes usually start with a verb which indicates the level at which the material is mastered. The levels used here are “familiarity”, “usage”, “assessment” and “innovation”. They refer roughly to “know the terms”, “can apply the concepts”, “can reflect and contrast”, “is able to expand, improve or replace the concepts”. The learning outcomes in this section are a summary of the knowledge units as claimed above.

Upon completion of this course, the student will be able to:

1. Demonstrate an ability to use knowledge, tools and practices relating to the following aspects of software engineering:
   a. Requirements
   b. Design
   c. Construction
   d. V&V
   e. Evolution
   f. Reliability
   g. HCI

2. Demonstrate familiarity with Complexity and Uncertainty

3. Demonstrate familiarity with approaches for dealing with complexity an uncertainty including Systems Thinking and Design Thinking

4. Demonstrate an understanding that software development is a complex activity conducted within a complex socio-technical environment

5. Demonstrate the ability to use professional judgment to select and apply appropriate knowledge, practices and tools to the development of non-trivial software systems within complex and uncertain environments taking into account social, ethical and sustainability concerns.

6. Demonstrate how practices and tools can be adapted to suit specific project needs and contexts.

Assessment

This section serves two purposes. The indicative assessment is provided to the students via programs and courses, while the rationale for the assessment structure connects the course to the graduate outcomes.

TODO
Tools, Languages, Environments and Equipment

This section is purely for internal use and planning of resources for a course. The choice of tools will fluctuate faster than the contents of the course.

TODO

Assumed Knowledge, Prerequisites and Corequisites

- PROG1..3

Comparison of Old versus New

When relating the new course to one or multiple courses from the current curriculum, also identify whether the course has migrated far enough from the current editions that a new name of course code would be required.

The proposed course can be viewed as a modern departure from the existing COMP2130. However, it will maintain common themes including modelling.

We will need:

- New course description
- New course new name - more than just analysis and design
- Perhaps simpler to have a new course code
(Computer Systems and Architectures 1)
ARCH1: Computer Organisation and Program Execution

Course Description

Write a narrative description, as per the format on programsandcourses

Architecture 1 lays the foundations for the understanding of CPU architectures, networking and operating systems. Additionally this course also introduces topics which cut across many computer science systems, like cross-layer communication, basic concurrency (as well as basic ideas of virtualization and efficiency through proximity).

CPU architectures are discussed from first principles (digital logic) and are expanded into current day designs. This also involves assembler level programming to connect hardware circuits to the world of software. Representations of data types and high-level code on machine level will become clear by keeping the relations between high-level and machine level code throughout the course. (Similarly, it will be investigated how concurrent software constructs will or will not translate into parallel hardware operations.)

Knowledge of principles of networking and operating systems (as well as their relation to computer hardware) are essential for every computer scientist and this course will provide those foundations.

While this course provides the above foundations (which stand on their own), it also prepares for the follow-up course Architecture 2 which completes the knowledge about concurrency in current computer systems of any scale as well as expands the networking and operating systems background.

The relation of assembler level building blocks (macros) to constructs in direct compiled language is demonstrated throughout the course.

ACM/IEEE Knowledge areas, units, core coverage

Fill the provided table with all knowledge units which are covered by the course. Note that by ticking a knowledge unit, the course takes responsibility to complete this unit to the degree listed to the left of the knowledge unit (“Familiarity”, “Usage” or “Assessment”).

The only sheet which you need to work on is “Curriculum Detail”. If you hover the pointer above the “KU Outcome” number, the full text of this specific knowledge unit appears (depending on your spreadsheet program your mileage may vary as in some only the beginning of the text may appear). In either case, the number refers to the Knowledge Unit inside the specific Knowledge Area as defined in the ACM 2013 Curricula Guidelines. So AL-Basic Analysis-5 refers to “List and contrast standard complexity classes”.

RSCS Curriculum Development Committee Agenda 3/2016
Knowledge unit table in a separate document, here appears only the core coverage summery by hours.
<table>
<thead>
<tr>
<th>KA</th>
<th>Kill</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Core</th>
<th>Allocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL</td>
<td>Basic Analysis</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>AL</td>
<td>Algorithmic Strategies</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>AL</td>
<td>Fundamental Data Structures and Algorithms</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>AL</td>
<td>Basic Software Architecture and Complexity</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>AR</td>
<td>Digital logic and digital systems</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AR</td>
<td>Machine-level representation of data</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AR</td>
<td>Assembly level machine organization</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AR</td>
<td>Memory system organization and architecture</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>AR</td>
<td>Interfacing and communication</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>CN</td>
<td>Introduction to Modelling and Simulation</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CS</td>
<td>Sets, Relations, and Functions</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>CS</td>
<td>Basic Logic</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>CS</td>
<td>Proof Theorems</td>
<td>10</td>
<td>1</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>CS</td>
<td>Basics of Counting</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>CS</td>
<td>Graphs and Trees</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>CS</td>
<td>Discrete Probability</td>
<td>6</td>
<td>2</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>CV</td>
<td>Fundamental Concepts</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>CV</td>
<td>Designing Interaction</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>HI</td>
<td>Foundations</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>HI</td>
<td>Designing Interaction</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>AS</td>
<td>Foundational Concepts in Security</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AS</td>
<td>Principles of Secure Design</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>AS</td>
<td>Defensive Programming</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AS</td>
<td>Threats and Attacks</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>AS</td>
<td>Network Security</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>AS</td>
<td>Cryptography</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IS</td>
<td>Information Management Concepts</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>IS</td>
<td>Database Systems</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>IS</td>
<td>Data Modeling</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>IS</td>
<td>Functional Issues</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IS</td>
<td>Basic Search Strategies</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>IS</td>
<td>Basic Knowledge Representation and Reasoning</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>IS</td>
<td>Basic Machine Learning</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>NC</td>
<td>Introduction</td>
<td>1.5</td>
<td>0</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td>NC</td>
<td>Networked Applications</td>
<td>1.5</td>
<td>0</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td>NC</td>
<td>Reliable Data Delivery</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>NC</td>
<td>Protocol and Communication</td>
<td>0.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>NC</td>
<td>Local Area Networks</td>
<td>0</td>
<td>1.5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>NC</td>
<td>Resource Allocation</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>NC</td>
<td>Mobility</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>OS</td>
<td>Overview of Operating Systems</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>OS</td>
<td>Operating System Principles</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>OS</td>
<td>Concurrentism</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>OS</td>
<td>Scheduling and Dispatch</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>OS</td>
<td>Memory Management</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>OS</td>
<td>Security and Protection</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>PD</td>
<td>Parallelism Fundamentals</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>PD</td>
<td>Parallel Decomposition</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>PD</td>
<td>Communication and Coordination</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>PD</td>
<td>Parallel Algorithms, Analysis, and Programming</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>PD</td>
<td>Parallel Architecture</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>PL</td>
<td>Object-Oriented Programming</td>
<td>4</td>
<td>6</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>PL</td>
<td>Functional Programming</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>PL</td>
<td>Event-Driven and Reactive Programming</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>PL</td>
<td>Basic Type Systems</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>PL</td>
<td>Program Representation</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>PL</td>
<td>Language Translation and Execution</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>SD</td>
<td>Algorithms and Design</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>SD</td>
<td>Fundamental Programming Concepts</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>SD</td>
<td>Fundamental Data Structures</td>
<td>12</td>
<td>0</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>SD</td>
<td>Development Methodology</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>SE</td>
<td>Software Processes</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>SE</td>
<td>Software Project Management</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SE</td>
<td>Tools and Environments</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SE</td>
<td>Requirements Engineering</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>SE</td>
<td>Software Design</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>SE</td>
<td>Software Construction</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SE</td>
<td>Software Verification</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>SE</td>
<td>Software Reliability</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SF</td>
<td>Computational Parallelism</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>SF</td>
<td>Cross-Layer Communications</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>SF</td>
<td>State and State Machines</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>SF</td>
<td>Parallellism</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SF</td>
<td>Evaluation</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>SF</td>
<td>Resource Allocation and Scheduling</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SF</td>
<td>Availability and Quality</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>SF</td>
<td>Reliability through Redundancy</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td>Social Context</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td>Software Tools</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td>Professional Ethics</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td>Intellectual Property</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td>Privacy and Civil Liberties</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td>Professional Communication</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SP</td>
<td>Sustainability</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
The knowledge areas addressed by the course:

*This table is automatically generated as one sheet inside the provided spreadsheet.*

<table>
<thead>
<tr>
<th>Week</th>
<th>Content</th>
<th>Lab activities</th>
<th>Assessment items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital logic and digital systems, Machine level presentation of data</td>
<td>AR-Digital logic and digital systems, AR-Machine level representation of data</td>
<td>Familiarisation</td>
</tr>
<tr>
<td>2</td>
<td>Assembly level machine organization and programming</td>
<td>AR-Assembly level machine organization</td>
<td>Assembler programming tasks</td>
</tr>
<tr>
<td>3</td>
<td>Macro assembly programming and usage of stacks for functional abstraction</td>
<td>AR-Assembly level machine organization</td>
<td>Complex assembler tasks preparing and aiding the first assignment</td>
</tr>
<tr>
<td>5</td>
<td>Cross-layer communications and principles of operating systems</td>
<td>AR-Interfacing and communication, OS-Overview of Operating Systems, SF-Cross-Layer Communications</td>
<td>Protected operations</td>
</tr>
</tbody>
</table>

Course Breakdown by Week

*The schedule should roughly reflect the knowledge areas which are addressed above. An indication how assessment items and lab activities are synchronize with the course content is also useful.*
Gradient Attributes

For each of the graduate attributes, state what contributions (if any) this course makes to achieving that graduate attribute or in which way the course supports or enhances any of those graduate attributes.

<table>
<thead>
<tr>
<th>Graduate Attribute</th>
<th>Addressed</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA2.1-2.3</td>
<td>2.3</td>
<td>Reflection of reliability and efficiency on hardware and architecture level.</td>
</tr>
<tr>
<td>GA3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA4.1-4.3</td>
<td>partly</td>
<td>Foundational knowledge and skills in architectures and their relation to algorithms and data structures.</td>
</tr>
<tr>
<td>GA5</td>
<td>yes</td>
<td>Abstraction and managing complexity are explicit topics in the course.</td>
</tr>
<tr>
<td>GA6.1-6.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA7.1-7.3</td>
<td>all</td>
<td>Provided by open assignments which require analysis of the problem as well as selection of appropriate techniques.</td>
</tr>
<tr>
<td>GA8</td>
<td>partly</td>
<td>Technical reports as part of the assignments.</td>
</tr>
<tr>
<td>GA9.1-9.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA10</td>
<td>partly</td>
<td>Independent work as well as professional conduct required for assignments.</td>
</tr>
</tbody>
</table>
Environment and technologies are new to most students. (This rationale will apply to almost all courses.)

Course Learning Outcomes (LOs)

Learning outcomes usually start with a verb which indicates the level at which the material is mastered. The levels used here are “familiarity”, “usage”, “assessment” and “innovation”. They refer roughly to “know the terms”, “can apply the concepts”, “can reflect and contrast”, “is able to expand, improve or replace the concepts”.

The learning outcomes in this section are a summary of the knowledge units as claimed above.

Upon completion of this course, the student will be able to:

1. Describe the layers of architectures in computer systems from digital logic to networks.

2. Explain how the major components of a CPU are composed (in terms of digital logic) and work together, (including how data is represented on a computer).

3. Design, implement and analyse programs in assembly language, including basic synchronization, I/O and interrupt techniques.

4. Describe the relationship between high-level languages and assembly languages, including function calls and basic control structures.

5. Demonstrate foundational knowledge about operating systems and networks.

6. Ability to express simple conditional and functional decomposition in a basic, direct compiled language (such as C).

Additional (overarching) Learning Outcomes

The learning outcomes here refer to holistic outcomes or outcomes

7. Connect conceptually hardware and software aspects of computer systems.

8. Have acquired the skill to migrate between all essential abstraction levels when discussing computer systems designs - ranging from a software oriented view all the way to individual digital circuits.

9. Posses a well founded understanding of the implications of machine level choices on efficiency and predictability in the context of the discussed hardware architectures.
Assessment

This section serves two purposes. The indicative assessment is provided to the students via programs and courses, while the rationale for the assessment structure connects the course to the graduate outcomes.

Assignments, Labs & Tutorials (40%), Exams (60%).

The rationale for a small number of larger assessment items is provided by the graduate outcomes under “Design” where the ability is required to “analyse well defined/complex problems” and to “design, implement and evaluate solutions (…)” (inside a reasonable open design space).

Assumed knowledge, Prerequisites and Co-requisites

Basic notion of high level programming. This is not bound to a specific programming language and can be provided by PROG1 and potentially by PROG0.

The course will provide the necessary foundations for ARCH2.

Tools, languages, environments and equipment

This section is purely for internal use and planning of resources for a course. The choice of tools will fluctuate faster than the contents of the course.

This course requires access to a pedagogically supportive assembler programming environment. The could be a simulator, a sandboxed environment or access to hardware modules. At this time this has not been decided for this course.

A submission and/or version control system which allows for direct assembly and test runs would be good. The best tool for the job has not been identified at this time.

Comparison of old versus new

When relating the new course to one or multiple courses from the current curriculum, also identify whether the course has migrated far enough from the current editions that a new name of course code would be required.

When relating this course to the current Comp2300 course, the following differences appear:

1. The new course does not introduce a programming language (C in the case of Comp2300) other than assembly, or introduces specific APIs. It does however build up C-style constructs out of assembly instructions.

2. ARCH1 keeps a connection to machine level programming throughout the course.

3. ARCH1 adds basic aspects of concurrency.

4. ARCH1 introducing ideas of (virtualization), layered architectures and (proximity).
5. ARCH1 provides essential foundations for operating systems and networks. Those foundations need to be sufficient for computer science students who will not take any further courses to this effect, i.e. potentially three-year-degree students.

It appears that the course can nevertheless keep its number as Comp2300 used to be closer to the current ARCH1 version in the past and both courses serve the same overall areas. The name though should reflect that the new courses ARCH1 and ARCH2 are closely connected and dependent.

**DEADLINE**

COB Monday, March 14, 2016.
Course Description

Write a narrative description, as per the format on programsandcourses

Architecture 2 is based on the foundations set by Architecture 1. It expands particularly into all forms of concurrent programming including aspects of massively parallel programming.

This course introduces all basic mechanisms to analyse, design, and manage concurrent, single computer-node (multicore) as well as distributed applications (e.g. as performance or dependability enhancements).

Following on from Architecture 1, the fields of operating systems and networking will also be expanded on. On the operating system side aspects of security, scheduling algorithms and memory management are discussed. More specific networking aspects follow on from message passing as a core concurrency construct. Those include basics of routing, dependable protocols.

ACM/IEEE Knowledge areas, units, core coverage

Fill the provided table with all knowledge units which are covered by the course. Note that by ticking a knowledge unit, the course takes responsibility to complete this unit to the degree listed to the left of the knowledge unit (“Familiarity”, “Usage” or “Assessment”).

The only sheet which you need to work on is “Curriculum Detail”. If you hover the pointer above the “KU Outcome” number, the full text of this specific knowledge unit appears (depending on your spreadsheet program your milage may vary as in some only the beginning of the text may appear). In either case, the number refers to the Knowledge Unit inside the specific Knowledge Area as defined in the ACM 2013 Curricula Guidelines. So AL-Basic Analysis-5 refers to “List and contrast standard complexity classes”.

Knowledge unit table in a separate document, here appears only the core coverage summery by hours.
<table>
<thead>
<tr>
<th>Core Coverage 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KA</strong></td>
</tr>
<tr>
<td>AL</td>
</tr>
<tr>
<td>AL</td>
</tr>
<tr>
<td>AL</td>
</tr>
<tr>
<td>AL</td>
</tr>
<tr>
<td>AR</td>
</tr>
<tr>
<td>AR</td>
</tr>
<tr>
<td>AR</td>
</tr>
<tr>
<td>AR</td>
</tr>
<tr>
<td>AR</td>
</tr>
<tr>
<td>CN</td>
</tr>
<tr>
<td>CS</td>
</tr>
<tr>
<td>CS</td>
</tr>
<tr>
<td>CS</td>
</tr>
<tr>
<td>CS</td>
</tr>
<tr>
<td>CS</td>
</tr>
<tr>
<td>CS</td>
</tr>
<tr>
<td>GV</td>
</tr>
<tr>
<td>GV</td>
</tr>
<tr>
<td>GV</td>
</tr>
<tr>
<td>IA</td>
</tr>
<tr>
<td>IA</td>
</tr>
<tr>
<td>IA</td>
</tr>
<tr>
<td>IA</td>
</tr>
<tr>
<td>IA</td>
</tr>
<tr>
<td>IA</td>
</tr>
<tr>
<td>IM</td>
</tr>
<tr>
<td>IM</td>
</tr>
<tr>
<td>IM</td>
</tr>
<tr>
<td>IS</td>
</tr>
<tr>
<td>IS</td>
</tr>
<tr>
<td>IS</td>
</tr>
<tr>
<td>IS</td>
</tr>
<tr>
<td>NC</td>
</tr>
<tr>
<td>NC</td>
</tr>
<tr>
<td>NC</td>
</tr>
<tr>
<td>NC</td>
</tr>
<tr>
<td>NC</td>
</tr>
<tr>
<td>NC</td>
</tr>
<tr>
<td>NC</td>
</tr>
<tr>
<td>OS</td>
</tr>
<tr>
<td>OS</td>
</tr>
<tr>
<td>OS</td>
</tr>
<tr>
<td>OS</td>
</tr>
<tr>
<td>OS</td>
</tr>
<tr>
<td>OS</td>
</tr>
<tr>
<td>PD</td>
</tr>
<tr>
<td>PD</td>
</tr>
<tr>
<td>PD</td>
</tr>
<tr>
<td>PD</td>
</tr>
<tr>
<td>PD</td>
</tr>
<tr>
<td>PL</td>
</tr>
<tr>
<td>PL</td>
</tr>
<tr>
<td>PL</td>
</tr>
<tr>
<td>PL</td>
</tr>
<tr>
<td>PL</td>
</tr>
<tr>
<td>PL</td>
</tr>
<tr>
<td>SDF</td>
</tr>
<tr>
<td>SDF</td>
</tr>
<tr>
<td>SDF</td>
</tr>
<tr>
<td>SDF</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SF</td>
</tr>
<tr>
<td>SP</td>
</tr>
<tr>
<td>SP</td>
</tr>
<tr>
<td>SP</td>
</tr>
<tr>
<td>SP</td>
</tr>
<tr>
<td>SP</td>
</tr>
<tr>
<td>SP</td>
</tr>
<tr>
<td>SP</td>
</tr>
</tbody>
</table>
The knowledge areas addressed by the course:

*This table is automatically generated as one sheet inside the provided spreadsheet.*

### Course Breakdown by Week

*The schedule should roughly reflect the knowledge areas which are addressed above. An indication how assessment items and lab activities are synchronize with the course content is also useful.*

<table>
<thead>
<tr>
<th>Week</th>
<th>Content</th>
<th>Lab activities</th>
<th>Assessment items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concurrency &amp; mutual exclusion</td>
<td>PD-Parallel Decomposition</td>
<td>Familiarisation &amp; motivating examples</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Condition Synchronization</td>
<td>PD-Parallel Architecture</td>
<td>Multiple forms of synchronization</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Message passing</td>
<td>NC-Reliable Data Delivery</td>
<td>Message passing examples</td>
</tr>
<tr>
<td>---</td>
<td>-----------------</td>
<td>---------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Non-Determinism / Data driven concurrency</td>
<td>PD-Communication and Coordination, IAS-Defensive Programming</td>
<td>Select statements</td>
</tr>
<tr>
<td>7</td>
<td>Safety and Liveness</td>
<td>SF-Resource Allocation and Scheduling, IAS-Defensive Programming</td>
<td>Deadlock analysis</td>
</tr>
<tr>
<td>8</td>
<td>Scheduling and operating systems</td>
<td>OS-Concurrency, OS-Scheduling and Dispatch, OS-Memory Management, OS-Security and Protection</td>
<td>Scheduling</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td>Safety</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>Message passing in networks</td>
</tr>
<tr>
<td>11</td>
<td>Distributed systems and networks</td>
<td>NC-Routing and Forwarding, NC-Local Area Networks, NC-Resource Allocation, NC-Reliability through Redundancy, NC-Mobility</td>
<td>Distributed applications</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>Wireless communication</td>
</tr>
</tbody>
</table>

**Graduate Attributes**

*For each of the graduate attributes, state what contributions (if any) this course makes to achieving that graduate attribute or in which way the course supports or enhances any of those graduate attributes.*

<table>
<thead>
<tr>
<th>Graduate Attribute</th>
<th>Addressed</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA1</td>
<td>partly</td>
<td>Examples for assignments and partly labs are sourced from other domains.</td>
</tr>
<tr>
<td>GA2.1-2.3</td>
<td>all</td>
<td>Real world problems from other domains as well as the limits of current technology are introduced and discussed.</td>
</tr>
<tr>
<td>GA3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GA4.1-4.3</td>
<td>partly</td>
<td>Foundational knowledge and skills in concurrency, operating systems and networks.</td>
</tr>
<tr>
<td>GA5</td>
<td>yes</td>
<td>Abstraction and managing large systems are explicit topics in the course.</td>
</tr>
</tbody>
</table>
Course Learning Outcomes (LOs)

Learning outcomes usually start with a verb which indicates the level at which the material is mastered. The levels used here are “familiarity”, “usage”, “assessment” and “innovation”. They refer roughly to “know the terms”, “can apply the concepts”, “can reflect and contrast”, “is able to expand, improve or replace the concepts”.

The learning outcomes in this section are a summary of the knowledge units as claimed above.

Upon completion of this course, the student will be able to:

1. Model, design and program concurrent systems.
2. Select appropriate modeling techniques, tools and mechanisms to solve a range of problems in concurrent and distributed systems. This includes the appropriate programming language and runtime environment for the task at hand.
3. Analyse and debug concurrent programs.
4. Understand the aspects of an operating system concerning scheduling, protection and memory management.
5. Employ message passing locally and over networks to construct a distributed systems.

Additional (overarching) Learning Outcomes

The learning outcomes here refer to holistic outcomes or outcomes

6. Distinguish as well as connect conceptual concurrency with physical parallelism on all levels of a distributed system.
7. Identify core aspects of operating systems and networks irrespective of the specific system at hand.
Assessment

This section serves two purposes. The indicative assessment is provided to the students via programs and courses, while the rationale for the assessment structure connects the course to the graduate outcomes.

2 assignments (40%); Mid-semester exam (10%), Final exam (50%).

The rationale for a small number of larger assessment items is provided by the graduate outcomes under “Design” where the ability is required to “analyse well defined/complex problems” and to “design, implement and evaluate solutions (...)” (inside a reasonable open design space).

Assumed knowledge, Prerequisites and Co-requisites

Basic notion of high level, imperative and functional programming as well as knowledge of all basic forms of polymorphism (to modularize programs) are required as prerequisites. This can (and will likely) be provided by PROG1-2.

The course also requires the student to have passed ARCH1.

Tools, languages, environments and equipment

This section is purely for internal use and planning of resources for a course. The choice of tools will fluctuate faster than the contents of the course.

This course requires access to a pedagogically supportive concurrent programming environment. Likely candidates are Ada, Chapel, Rust, C++ and Erlang, yet concurrent programming environments develop quickly at this time.

A submission and/or version control system which allows for direct assembly and test runs would be good. The best tool for the job has not been identified at this time.

Comparison of old versus new

When relating the new course to one or multiple courses from the current curriculum, also identify whether the course has migrated far enough from the current editions that a new name of course code would be required.

When relating this course to the current Comp2310 course, the following differences appear:

1. ARCH2 can now assume basic knowledge about concurrency and its foundation on hardware level.
2. ARCH2 can now also assume introductory knowledge about operating systems and networks.
3. ARCH2 also takes on the responsibility to provide essential basics of operating systems and networks. Those are expansion areas compared to Comp2310.
It appears that the course can keep its number as Comp2310 as the prerequisites were formally the same earlier. The name though should reflect that the new courses ARCH1 and ARCH2 are closely connected and dependent.

**DEADLINE**

COB Monday, March 14, 2016.
Foundations of Computing

Topics covered from ACM-IEEE

1. Logic (17 hours)
   1. DS/Basic Logic (Propositional and first order logic) Tier 1, 5 hours (4 Tier 1 hours in DM)
   2. DS/Proof Techniques Tier 1, 5 hours / Tier 2 1 hour (5 Tier 1 hours in DM)
   3. DS/Discrete Probability (Bit more than what is covered in DM or add it to DM) Tier 1 2 hours (4 hours in DM) Tier 2 2 hours
   4. IS/Basic Knowledge Representation and Reasoning (Expressing natural language using logic) Tier 2 0.5 hour (2 hours in Data)
   5. IS/Basic Knowledge Representation and Reasoning (Natural deduction for propositional and first order logic) Tier 2 0.5 hour (2 hours in Data)
   6. SE/Formal Methods Elective 1 hour (Formal verification of programs)

2. Automata
   1. AL/Basic Automata Computability and Complexity
   2. AL/Advanced Computational Complexity (Elective) comp3630?
   3. AL/Advanced Automata Theory and Computability (Elective)? comp3630?

Topics left out

These will be covered in the programming courses (mainly PROG2, as I understand)

1. Algorithms
   1. AL/Basic Analysis
   2. AL/Algorithmic Strategies
   3. AL/Fundamental Data Structures and Algorithms (Mostly in Prog.)
   4. IS/Basic Search Strategies (Heuristics?. Do this in Data.)

Course description

This course presents some formal notations that are commonly used for the description of computation and of computing systems, for the specification of software and for mathematically rigorous arguments about program properties. The following areas of study constitute the backbone of the course. Predicate calculus and natural deduction, inductive definitions of data types as a basis for recursive functions and structural induction, formal language theory (particularly regular expressions, finite state machines and context free grammars), specification languages and propositional programming language semantics.

Approximate schedule of topics, with 4 small assignments

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Logic and virtual set theory basics (revision of material from MATH1005)</td>
<td>Assignment 1: Struct. induction and proofs</td>
</tr>
<tr>
<td>2</td>
<td>Structural induction</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Logic: deduction</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Logic: semantics</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Logic as a specification language (basic KRR)</td>
<td>Assignment 2: KR (formalisation)</td>
</tr>
</tbody>
</table>
### Week Topics Assessment

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Revision and mid-term quiz</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Finite state automata - deterministic and non-deterministic</td>
<td>Assignment 3: Grammars and Automata</td>
</tr>
<tr>
<td>8</td>
<td>Context-free languages, pushdown automata</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Turing machines and computability (I)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Turing machines and computability (II)</td>
<td>Assignment 4: Turing machines</td>
</tr>
<tr>
<td>11</td>
<td>Hoare logic and basic program specification (I)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Hoare logic and basic program specification (II)</td>
<td></td>
</tr>
</tbody>
</table>

### Learning outcomes

Upon completion of this course, the student will be able to:

1. Apply the concepts of standard mathematical logic to produce proofs or refutations of well-formed propositions or arguments phrased in English or in a variety of formal notations (first order logic, discrete mathematics or Hoare Logic). (Assignments 1 and 2, quiz, exam)

2. Given a description of a regular language, either in English, as a regular expression or as a grammar, generate a finite state automaton that recognizes that language. Similarly, given a deterministic or nondeterministic automaton, give a description of the language which it accepts. (Assignment 3, exam)

3. Given an inductive definition of a simple data structure, write a recursive definition of a given simple operation on data of that type. Given some such recursively defined operations, prove simple properties of these functions using the appropriate structural induction principle. (Assignment 1, quiz, exam)

4. Prove simple programs correct using Hoare Logic. (Exam)

5. Design a Turing Machine which will accomplish simple tasks. (Assignment 4. Also exam(?) )

### Indicative assessment

Assignments (36%); Tutorials (4%); Quiz (10%); Final Exam (50%)

### Requisite and Incompatibility

To enrol in this course you must have completed MATH1005 and one of PROG00 or PROG01.

### Prescribed Texts

There is no prescribed text for COMP THEORY, but the following are recommended references. More may be added as the semester progresses.

- Bergmann, Merrie The Logic Book, McGraw-Hill.
- Munro, John Discrete Mathematics for Computing Thomas Nelson.
Difference from comp2600

Inclusion of more introductory material on logic. The exclusion of separation logic and weakest precondition calculus.

We can use the same course code, but change the title of the course
Part 4 – Items of other business

Item 8  Meeting Dates 2016

Purpose
To note the remaining meeting dates for 2016

Recommendation
That the Committee note the dates of the remaining 2016 meetings.

<table>
<thead>
<tr>
<th>RSE and RSCS CDC Agenda Deadline</th>
<th>RSCS CDC Meeting 12-2pm RSISE B123</th>
<th>Notes and Deadlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 June</td>
<td>30 June</td>
<td>Final Deadline for:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Amendments to UG Awards for 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Amendments to PG Awards for 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Creation of PG Awards for 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Disestablishment of PG Awards for 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(CEC DL: 7 July)</td>
</tr>
<tr>
<td>29 August</td>
<td>8 September</td>
<td>CDC Deadline for amendments to courses which are scheduled for Semester 1, 2017 and Diploma of Computing Program Review (CEC DL: 22 September);</td>
</tr>
<tr>
<td>13 October</td>
<td>20 October</td>
<td></td>
</tr>
</tbody>
</table>

Sponsor
Associate Director (Education)
Research School of Computer Science

Item 9  Other business and question time

Purpose
For Committee members to ask questions and raise items of other business

Recommendation
That the Committee note the matters raised and the responses.

Sponsor
Associate Director (Education)
Research School of Computer Science