School of CSE - Details Needed for Course Revision Proposal

Course Title: *Digital Circuits and Systems*

Proposer: *Sri Parameswaran*

Rationale
Why is the revision being proposed?

The revision is being proposed to remove DSS (COMP2021) as a compulsory course for the following programs:
Computer science; and
Software Engineering.
Microprocessors and Interfacing will become a compulsory course for the above students.
As we move towards an era where the predominant hardware building block is a microprocessor/microcontroller as opposed to a gate, it is far more important to educate students in building systems with microprocessor/microcontrollers than systems with gates. DCS will be an available for these students as an elective. This proposal addresses an existing gap.

What are the academic objectives?

The specific objective is to develop engineering skills in the design and analysis of digital logic components and circuits, to make students thoroughly familiar with the basics of gate-level circuit design starting from single gates and building up to complex systems, and to provide hands-on experience and exposure to circuit design using state-of-the-art computer aided design tools and (in the near future) programmable logic devices.

Which programs/stage(s) does it serve? What proportion of students
do you expect to come from which program? (It is legitimate not
to have a full answer to that, but if you do have one, we'd like to
know).
Year 2: All CE students will be required to do DCS.
Elective for all SE and CS students. Less than 20% of students would be take this subject.

Why can the same objectives not be achieved with the current course?
This would require an additional compulsory subject for CS and SE students.

How does the proposed course relate to other courses?
This course has the same relationship as per the current COMP2021
What overlap is there?
As per current COMP2021
If there is any overlap, why is this justified/not a problem?

Stakeholders and Consultation
Who are the potential stakeholders, who was consulted about the
proposal (inside the School as well as outside), what was the
result of that consultation?
HoS, TC chair, Program Director SE, Academic Director EE, and a number of student and staff consultations. There was general agreement.

Enrolment Impacts
Likely enrolment (with justification), and impact on enrolments of

other courses.

Enrolment is likely to fall to about 70 from the current 200 or so. This could probably be run once a year.

Justification of Prerequisites (or lack thereof)
As per COMP2021

Delivery and Assessment
Anything noteworthy about delivery mode, assessment (with justification).
As per COMP2021.

Handbook Entry
This course aims to provide students with a knowledge of problem solving with digital systems (computer systems and digital circuits). The basic building blocks of combinational and sequential circuits are introduced to develop circuit solutions to problems and to understand and implement the design and operation of hardware models of digital and computer systems. HDLs will be used to describe circuits and State of the art computer aided design tools will be used to design complex systems.
Textbooks/References

Syllabus
Indicative syllabus / overview of contents (at a level of detail
well beyond that of the handbook entry)

- *Boolean Algebra and its relationship to logic gates*
- *Combinational Circuit Design*
- *Combinational Circuit Analysis*
- *Physical properties of Combinational Gates and Circuits – Timing – Engineering Limitations*
- *Sequential Circuit Design Fundamentals*
- *Sequential Circuit Analysis Fundamentals*
- *Physical Properties of Flip-Flops and Sequential Circuits – Timing – Engineering Limitations*
- *Design a block diagram solution from a worded functional description of a medium size digital system.*
- *Skillful in modern techniques of digital systems design, specifically the use of HDL - (Hardware Description Language), and FSM state diagrams.*
- *A sound knowledge of the timing characteristics of devices used in digital systems, and how to determine timing problems and then correct them.*
- *Implement circuits and test.*

Effect on School Resources:
1. Who is proposed to teach the proposed new course, and
   what impact would this have on their planned/current allocation?
TBD

2. What sort of tutorial component is proposed, if any?
1 hour/week as per COMP2021

3. What is the likely impact on lab utilisation (this relates
   to assignment and project work as well as scheduled labs?
As per COMP2021

3. Any other resource needs? E.g. special print/disk quota, access to
   servers, access to special machines, special labs.
Probably move towards FPGA designs.