

UG3 Computer Communications & Networks (COMN): Course Re-Design

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Introduction

This document describes the proposed changes to the UG3 Computer Communications and Networks (COMN) course (INFR09027) to turn it into a 20 credit, level 10 course.

In its current form, COMN course falls short of serving as a comprehensive foundational course in communication networks and also does not capture the developments in the field over the past decade. So our aim is to address this issue by complementing the material currently covered in this course with additional topics and similarly extend the coursework component (while keeping its weight same as now).

Note that these proposed changes are intended only to make COMN a solid introduction to the subject of communication networks as it is today, and not to turn it into an advanced computer networking course suitable for postgraduate and research students; there is already a level 11 Computer Networking (CN) course that does the latter.

Besides making COMN a 20 credit course, we also propose to make it a level 10 course to give students the flexibility to take it in year 4 in view of the large number of 20-credit year 3 courses. COMN would still be recommended for students wanting to build a solid background in networks to take it in year 3 and then follow it up with CN in year 4. Current enrollment data in these courses¹ shows that such students make up only less than third of those taking COMN course. COMN in its proposed/expanded form would meet the requirements outlined under SCQF Level 10 Descriptors.

The rest of the document elaborates on changes to course syllabus, coursework, time distribution among different course activities and assessment aspect.

Course Content

Currently the COMN course follows the classical approach of teaching networks by considering each of the protocol layers in turn, which implicitly makes it data plane centric and does not capture the full picture. There have been significant developments in the networking field especially in the past decade on network control and management with the emergence of software-defined networking (SDN) and network (function) virtualisation for greater flexibility, programmability/evolvability and infrastructure sharing for cost-effectiveness. Expanding the coverage to include these developments, which have now

¹ COMN and CN currently have 138 and 44 students enrolled in them, respectively. MSc students also take the CN course.

reached maturity and acceptance, is essential for a comprehensive and contemporary first course in networking. With this in mind, we propose to increase the number of lectures by nearly 70% to extend the course syllabus including the following additional topics:

- Software-defined networking (SDN)
- Network virtualisation and network function virtualisation (NFV)
- Network management
- Comprehensive treatment of networked applications (incl. multimedia data and applications)
- Introduction to data centre and wireless networks
- Network security (in a way that is complementary to its treatment in the Computer Security course)

Coursework

The current COMN coursework assignment has been developed and refined over several years and provide solid experience for students in socket programming and network protocol implementation. However its focus on providing reliability support at the application layer limits the scope of hands-on experience to just the initial part of the course (i.e., application and transport layers).

We therefore propose to introduce two additional coursework assignments that provide opportunity to gain practical understanding and experience with other aspects and dimensions in line with the expanded syllabus. In particular, the two new assignments would be picked from the following alternatives:

- Network protocol and traffic analysis task using Wireshark²
- An assignment that involves prototyping a small SDN based system using Mininet³
- An assignment that involves examining different network switch architectures.

Each of the two new assignments will carry 10% of the overall course mark (and will need to be carried out over 2 weeks each) while the current assignment amounts for 20% of the overall course mark over 4 weeks. Note that overall weighting of the coursework will remain at 40% as it is now; relatively large weighting on the coursework is appropriate for an applied/systems subject like computer networking.

Time Allocation and Assessment

Time Distribution

The distribution of time among different course activities are summarised in the table below.

² <https://www.wireshark.org/>

³ <http://mininet.org/>

| Activity | Current | Proposed | Delta |
|--|----------------|-----------------|--------------|
| Lectures | 18 | 30 | +12 |
| Summative Assessment | 2 | 2 | 0 |
| Programme Level Learning and Teaching | 2 | 2 | 0 |
| Directed Learning and Independent Teaching | 38 | 86 | +48 |
| Coursework | 40 | 80 | +40 |
| Total | 100 | 200 | +100 |

Assessment

The following table shows the impact of the proposed changes on the assessment.

| Item | Current | Proposed | Delta |
|--------------|----------------|------------------|--------------|
| Written Exam | 60% | 60% | 0 |
| Coursework | 40% | 40% ⁴ | 0 |

⁴ Coursework component in the re-designed course will be made up of 20% (for the current assignment) and 10% each for the two new assignments.