1. **Title of subject** | High Speed Networks  
2. **Subject code** | THN3031  
3. **Status of subject** | Major  
4. **Credit Hour** | 3  
   - 28 Hours of Lecture  
   - 14 Hours of Tutorial  
   LAN’s Credit Hours Equivalent: 2.67  
5. **Semester** | Trimester 2 (Delta Level)  
6. **Pre-Requisite** | TCE2321 Computer Networks  
7. **Methods of Teaching** | 28 Hours of Lecture  
   - 14 Hours of Tutorial  
8. **Assessment** | 40 % Coursework  
   - Test 10 %  
   - Assignment 30 %  
   60 % Final Exam  
   **Total 100%**  
9. **Teaching staff (Proposed)** | Dr. M.N Ahmad Hamarsha  
   Asrul Hadi Yaacub  
   Hussein Aziz Basi  
10. **Objective of subject** | To introduce the new developments in modern networking systems, multimedia communications and high speed networks.  
11. **Synopsis of subject** | The emergence of high-speed networks is inevitable and so does the need to understand them. This course also explains various performance and analysis issues involved in understanding the need of high-speed data transmission.  
   Pelajar akan didedahkan dengan analisa untuk memahami keperluan rangkaian. Kursus ini akan memperkenalkan teknik-teknik yang digunakan untuk memahami kehendak rangkaian kelajuan tinggi.  
12. **Learning Outcomes** | By the end of the subject, students should be able to:  
   - Understand the basics of high speed networking technologies.  
   - Apply the concept learnt in this course to optimize and troubleshoot high-speed network.  
   - Demonstrate the knowledge of network planning and optimization  
   **Programmes Outcomes** | **Degree of Contribution (%)**
| Ability to apply soft skills in work and career related activities | 5 |
| Good understanding of fundamental concepts | 35 |
| Acquisition and mastery of knowledge in specialized area | 30 |
| Acquisition of analytical capabilities and problem solving skills | 15 |
| Adaptability and passion for learning | 5 |
| Cultivation of innovative mind and development of entrepreneurial skills | 5 |
| Understanding of the responsibility with moral and professional ethics | 5 |

<table>
<thead>
<tr>
<th>13. Details of subject</th>
<th>Topics Covered</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td><strong>3. Storage Area Networks</strong>&lt;br&gt;Storage and networking concepts. Fibre channel SAN topologies. IP SAN technology. Management of SAN</td>
<td>2</td>
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<td>4.</td>
<td><strong>4. Optical Networks – WDM Networks</strong>&lt;br&gt;WDM technology. Control and signalling schemes in WDM networks. IP over WDM. Protection and restoration on WDM Networks.</td>
<td>2</td>
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<tr>
<td>5.</td>
<td><strong>5. Optical Networks – SONET Networks</strong>&lt;br&gt;SONET technology. SONET Transport network architectures. IP over SONET. Survivability in SONET Systems- Automatic Protection Switching (APS). Restoration techniques on SONET networks</td>
<td>2</td>
</tr>
</tbody>
</table>
| 6. | 6. Network performance measurement and modelling  
Queuing analysis: queue behaviour, single-server queues, multi-server queues, queues with priorities, network queues, other queuing models. Internet traffic: self-similarity, Ethernet traffic, World-Wide-Web traffic. | 4 |
| 7. | **7. Congestion control and traffic management**  
Effects of congestion, congestion and control, traffic management, congestion control in packet-switching networks, TCP traffic control: TCP flow and congestion control. | 4 |
| 8. | **8. Internet routing**  
Graph theory concepts, least cost paths, interior routing protocols: internet routing principles, distance-vector protocol - RIP, link-state protocol – OSPF, exterior routing protocols: path-vector protocols – BGP and IDRP, multicasting. | 4 |
| 9. | **9. Quality of service (QoS) in IP networks**  
Integrated service architecture (ISA), queuing discipline, differentiated services, resource reservation protocol (RSVP), Multi-protocol label switching (MPLS), Real-time transport protocol (RTP). | 4 |
| 10. | **10. Application Layer Control and Systems**  
Web caching. Web server scheduling. Bidding Systems, integrated scheduling. | 2 |
| **Tutorial** | TCP/IP and Legacy LAN  
High Speed LAN  
WDM and Sonet Networks  
QoS and Network Performance  
Congestion Control & Traffic Management  
Internet Routing  
QoS in IP networks | |
| **Total Contact Hours** | 28 |
| 14. **Text** | **Text Book:**  
Gallo & Hancock, Computer Comm. And networking Technologies, Thomson Learning.2001  