INTRODUCTION
This program is designed to deepen the understanding and applications of communications engineering mainly in two focused areas which are wireless and photonics communications. The courses offered emphasize on various levels of communications such as devices, systems, transmission, networks and standards for both areas. Both wireless and photonics technologies are high impact research areas that can support many applications in various fields including agriculture, communication, sensing and many others.

PROGRAMME REQUIREMENTS

Credit Requirements for Graduation
Students enrolling under this programme must fulfill 40 credits of course work to graduate. The credit distributions for compulsory courses, elective courses and dissertation are as follows:

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Compulsory Courses</td>
<td>24 credits</td>
</tr>
<tr>
<td>Elective Courses</td>
<td>6 credits</td>
</tr>
<tr>
<td>Dissertation</td>
<td>10 credits</td>
</tr>
</tbody>
</table>

Compulsory Courses
Students must take all the listed compulsory courses:

- ECC5120 ICT Project Management : 3 credits
- ECC5123 Research Methods in Computer and Communication Engineering : 3 credits
- ECC5121 Sustainability in Telecommunication Technology : 3 credits
- ECC5122 Standards and Regulations in Communication : 3 credits
- ECC5507 Advanced Cellular and Satellite Communication : 3 credits
- ECC5611 Advanced Optical Fiber Networks : 3 credits
- ECC5720 Advanced Digital Signal Processing : 3 credits
- ECC5721 Advanced Computer Networks : 3 credits
- ECC5988 Dissertation : 10 credits

Note: ECC5988 – Dissertation is carried out over two semesters.

Elective Courses
Students must take only two elective courses (6 credits) out of the listed below:

- ECC5409 Network Management : 3 credits
- ECC5503 Microwave Engineering : 3 credits
- ECC5522 Wireless Sensor Network : 3 credits
- ECC5621 Photonic Devices Design : 3 credits
- ECC5723 Network Security : 3 credits
- ECC5724 Advanced Mobile Networks : 3 credits

Identification on the elective courses for the student will be made by the program coordinator.
### Course Synopsis

- **ECC5120**  
  *Advanced Computer Networks*  
  This course covers topics related to ICT project management such as procedures to initiate projects, planning and scheduling methods, and the tools in project planning such as the use of network and Gantt chart. This course also covers methods in implementing and controlling projects to ensure project objectives and its completion time can be realized.  
  **3 credits**

- **ECC5123**  
  *Research Methods in Computer and Communication Engineering*  
  This course covers the best practices in the execution of graduate research in computer and communication systems engineering. It encompasses overview of research methodology, hallmarks of scientific research, research design, thesis writing, oral presentations, and ethical considerations in engineering research.  
  **3 credits**

- **ECC5121**  
  *Sustainability in Telecommunication Technology*  
  This course covers the concept of sustainability in the field of computer and communication system engineering. The studies include introduction on the sustainability, environmental cost, electronic technologies for energy efficient and sustainable growth, sustainable business model, network energy consumption, power contributors, energy improvement and international forums on green and sustainable telecommunication technology.  
  **3 credits**

- **ECC5122**  
  *Standards and Regulations in Communication*  
  This course covers standards and regulations in communications-related technology and services, addresses the application of standards to and regulation to their implementation and analyses issues of standards and regulation based on selected case studies.  
  **3 credits**

- **ECC5507**  
  *Advanced Cellular and Satellite Communication*  
  This course covers cellular and satellite concept as the basis for system design. Mobile radio propagation of large and small scale and length scale body, advanced modulation techniques in cellular and satellite communications, multiple access techniques and the current and future wireless system related to cellular and satellite will also be discussed.  
  **3 credits**

- **ECC5611**  
  *Advanced Optical Fiber Networks*  
  This course covers the important issues in optical networks including the existing and future. Emphasis will be given on network elements and design, control and management, and protection and survivability of the particular networks.  
  **3 credits**

- **ECC5720**  
  *Advanced Digital Signal Processing*  
  This course covers topics related to advanced digital signal processing, that covers advanced aspects of the signal and noise properties. The discussion includes the wavelets transforms, Bayesian inference and Hidden Markov Model to model the signal and noise. Furthermore, the course focuses on the adaptive filters, linear prediction model, power spectrum and correlation and real time digital signal processing.  
  **3 credits**

- **ECC5721**  
  *Advanced Computer Networks*  
  **3 credits**

- **ECC5988**  
  *Dissertation*  
  The topic is chosen from one of the following areas: Wireless communication engineering, photonics and optical system engineering, communication and network engineering or any engineering fields deemed appropriate by the program.  
  **10 credits**

- **ECC5409**  
  *Network Management*  
  This course covers management and monitoring effective computer network systems. It provides an understanding of the principles and practices needed for smooth operation of computer network systems.  
  **3 credits**

- **ECC5522**  
  *Wireless Sensor Network*  
  This course covers the principles and applications of wireless sensor network. Features of wireless sensor network covered are network architecture, topology, protocols, hardware platform and applications.  
  **3 credits**

- **ECC5621**  
  *Photonic Devices Design*  
  This course covers the application of the latest optical devices and optical devices technology. It also covers the design of geometric optics devices, integrated optic devices, planar waveguides’ fabrication techniques, passive integrated optic devices and active integrated optic devices.  
  **3 credits**

- **ECC5723**  
  *Network Security*  
  This course covers the principles of computer network security such as cryptography, security policy and design, and intrusion detection. The basic building blocks of network security infrastructure are discussed with emphasis on firewall, router security, virtual private network (VPN) and monitoring. A practical approach of network intrusion using latest method and tools are also presented.  
  **3 credits**

- **ECC5724**  
  *Advanced Mobile Networks*  
  This course covers mobile networks, enabling technologies, mobile network systems, mobility management in services/personal communication networks (PCS/PCN), wireless adhoc networks, support systems for mobile networks and other mobile networks.  
  **3 credits**

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**For further information**

**Please contact:**

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Universiti Putra Malaysia  
43400 UPM Serdang  
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Malaysia  
Tel: 603-9769 6266/6253  
Email: eng_tds@upm.edu.my  
Website: http://www.eng.upm.edu.my/
ADMISSION REQUIREMENTS

a) Bachelor in the field of Electrical or Communications Engineering with a CGPA of 2.75/Second Class Lower; or

b) Bachelor in the field of Electrical or Communications Engineering with a CGPA of 2.50/Second Class Lower with at least three (3) years of working experience in the field of study that is being applied for; or

c) Bachelor in any related field of Science or Technology with a CGPA of 3.00/Second Class Upper; or

d) Bachelor in any related field of Science or Technology with a CGPA of 2.75/Second Class Lower with at least three (3) years of working experience in the field of study that is being applied for; or

e) A qualification equivalent to a Bachelor's degree recognized by the professional bodies and MQA

Note: * For candidate with Bachelor of Science or Technology degrees or equivalents are admitted, prerequisite modules from the field of electronics, communications and signal processing need to be offered to them in order to adequately prepare them for the advance study.

FEES

<table>
<thead>
<tr>
<th>Fees</th>
<th>Malaysian Student</th>
<th>International Student</th>
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<tbody>
<tr>
<td>Basic Fees (1st semester)</td>
<td>RM1,250</td>
<td>RM2,300</td>
</tr>
<tr>
<td>Basic Fees (2nd and subsequent semester)</td>
<td>RM1,000</td>
<td>RM2,050</td>
</tr>
</tbody>
</table>
| Credit Fees  
  • subject to change | RM250 / credit hour | RM350 / credit hour |

Language Requirement

• A Malaysian candidate must have obtained at least a credit in English at Sijil Pelajaran Malaysia level or have passed English courses conducted at the Diploma or Bachelor’s Level.

• All international candidates from countries where English is not a medium of instruction must have obtained a minimum score of 550 for TOEFL Paper-based Test (Academic Version); or Band 6.0 for IELTS (Academic Training); or 79-80 for TOEFL Internet-based Test (Academic Version).

• A candidate without the requisite minimum score for TOEFL or IELTS may be granted a provisional admission. Such candidate will be required to pass an English Placement Test conducted by the University.

• A candidate who has failed the English Placement Test will be required in the first semester to pass a prescribed English course. Should the candidate fail to obtain the prescribed minimum grade, the University may allow him to repeat the prescribed English course in the second semester.

• A candidate who fails after the second attempt will have his candidature suspended until he passes the English course before being allowed to continue with his Masters programme.

Application For Admission

Please apply online via http://sgsportal.upm.edu.my:8080/sgsportal/
Tel. : (603) 9769 4218/4223/4228
Website : http://www.sgs.upm.edu.my/prospective_students-2964