M1: Module Descriptor Template

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Pre-requisite Module codes</th>
<th>Co-Requisite Modules code(s)</th>
<th>ISCED Code</th>
<th>Subject Code</th>
<th>ECTS Credits</th>
<th>NFQ Level (CPD)#</th>
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<tbody>
<tr>
<td>COMM4602</td>
<td>COMM2603</td>
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Module Title: Wireless Communications

School Responsible: Electrical and Electronic Engineering

Module Overview:
This module provides an introduction to modern wireless-based communications systems. The student is introduced to the fundamental concepts of wireless communications and to the standards employed in modern and emerging wireless communications systems.

Learning Outcomes (LO):
On Completion of this module, the learner will be able to

1. Formulate a global and integrated view of the emerging wireless and mobile systems, taking into account the complexities involved in the wireless environment.
2. Develop empirical models for various wireless channels and identify the limitations of these models.
3. Select suitable numerical techniques (method of moments, time/frequency domain solvers, finite elements etc) for the analysis of wireless antennas.
4. Identify the different elements comprising a wireless/cellular communications system, in the context of the different wireless standards and their applications.
5. Demonstrate knowledge regarding electromagnetic safety issues, in wireless communications.
6. Demonstrate familiarity with technical terms, specific to wireless communications.

Indicative Syllabus:
- Antennas: Antennas for personal and wireless communications, antenna parameters and modelling. Introduction to diversity combining; Space diversity, Frequency diversity, Polarization diversity.
- Fundamentals of Radio Propagation and Channel Models: Large scale path loss; free space and ground reflection models, modern PCS models. Design of point to point wireless links, link budget. Small scale fading & mitigation techniques. Indoor radio propagation and delay spread.
- Selected Topics in Modern Wireless Systems: Emerging systems including ultra wideband (IEEE 802.15.4, IEEE 802.15.6).
- Access Techniques: FDD, TDD and access techniques, FDMA, TDMA and CDMA.
- Standards: Wireless systems and standards (to include DECT, WLAN 802.11x and emerging systems 802.15.x).

Laboratory Activities:
- Wireless propagation modelling.
- Wireless antenna design and modelling.
- Indoor radio propagation measurements.

Learning and Teaching Methods:
The module is delivered as a series of lectures and laboratories as well as includes self-directed learning.

Total Teaching Contact Hours: 39
Total Self-Directed Learning Hours: 52

Module Delivery Duration:
The module will be delivered as a series of lectures (2 hours per week) and laboratories (2 hours alternating weeks) over one semester.

Assessment

<table>
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<tr>
<th>Assessment Type</th>
<th>Weighting (%)</th>
<th>LO Assessment</th>
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**Module Title**: Wireless Communications

<table>
<thead>
<tr>
<th>Assessment Schedule</th>
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<tbody>
<tr>
<td>(No.)</td>
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<tr>
<td>A formal examination of 2 hours duration</td>
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<tr>
<td>Project</td>
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**Module Specific Assessment Arrangements (if applicable):**

| (a) Derogations from General Assessment Regulations | None |
| (b) Module Assessment Thresholds | 35% |
| (c) Special Repeat Assessment Arrangements | None |

**Essential Reading:**

**Version No:** 1 (20 March 2015)  
**Amended By:** M.Ammann

**Commencement Date**: September 2015  
**Associated Programme Codes**: DT0XX

* Modules that are to be offered as Stand-Alone CPD Programmes must have an NFQ level assigned  
* Details of the assessment schedule should be contained in the student handbook for the programme stage.

Date of Academic Council approval ………………………….