

# Unit Outline (Higher Education)

<b>Institute / School:</b>	Institute of Innovation, Science & Sustainability
<b>Unit Title:</b>	MOBILE NETWORKS AND WIRELESS COMMUNICATIONS
<b>Unit ID:</b>	ITECH2300
<b>Credit Points:</b>	15.00
<b>Prerequisite(s):</b>	(ITECH1002 or ITECH1102)
<b>Co-requisite(s):</b>	Nil
<b>Exclusion(s):</b>	Nil
<b>ASCED:</b>	020113

## Description of the Unit:

The rapid growth of mobile telephony, the Internet, and associated technologies is generating tremendous change, opportunities, and challenges for telecommunications and networking in all domains such as e-business, e-health, transport, government, and industry. Mobile networks and wireless communications include 5G cellular networks, satellite services, mobile broadband, wireless broadband, wireless local, and personal area networks, as well as smartphones, tablets, and the emerging platform of the Internet of Things. In this unit, we will investigate the background of wireless communications and mobile networking covering: transmission media fundamentals, antennas, signal propagation, channel fading models, spread spectrum technologies, wireless local area network, and Bluetooth standards. We will also cover cellular network design concepts and practices, LTE-A/5G mobile networks, and advanced networking concepts. This unit provides you with the opportunity to develop sound knowledge and skills to analyse and appreciate wireless and mobile technologies and standards to solve problems in these areas.

**Grade Scheme:** Graded (HD, D, C, P, MF, F, XF)

## Work Experience:

No work experience: Student is not undertaking work experience in industry.

**Placement Component:** No

**Supplementary Assessment:** Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

**Course Level:**

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advanced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Learning Outcomes:**
**Knowledge:**

- K1.** Describe the role of wireless and mobile communications in communication networks.
- K2.** Explain wireless media characteristics, signal propagation and channel fading.
- K3.** Describe various multiple access technologies used in today's mobile networks.
- K4.** Discuss the operation of advanced mobile networking technologies such as the 5G, 4G and LTE-A networks.
- K5.** Explain small-scale wireless networks such as WiFi and bluetooth.
- K6.** Apply design concepts of cellular networks.

**Skills:**

- S1.** Analyse various modulation and access techniques using simulations.
- S2.** Solve problems in the domain of wireless communications and mobile networks.

**Application of knowledge and skills:**

- A1.** Synthesise information from various sources, including analysis of simulations of various techniques to produce a high quality report.
- A2.** Analyse and make decisions in choosing appropriate wireless and mobile technologies.

**Unit Content:**

Topics may include:

- Mobile and wireless communications: new applications, market trend, opportunities and challenges.
- Wireless and wired transmission media: capacity, cost and deployment scenarios.
- Wave propagation and antennas: propagation modes, antenna characteristics and gain.
- Large and small-scale propagation models, doppler spread and channel fading models.
- Modulation techniques used in radio frequency.
- Spread spectrum concepts and techniques, such as FHSS and DSSS.

- Multiple access techniques in wireless communications, such as FDMA, TDMA, CDMA, CSMA.
- Cellular systems: concepts, operation and design consideration; 5G/4G/LTE-A network.
- Small-scale networks: Wireless Local Area Networks (WiFi) and Wireless Personal Area Networks (Bluetooth).
- Wireless broadband, next-generation heterogeneous networks, Internet of Things, and cognitive radio networks

## FEDTASKS

Federation University Federation recognises that students require key transferable employability skills to prepare them for their future workplace and society. FEDTASKS (**T**ransferable **A**tttributes **S**kills and **K**nowledge) provide a targeted focus on five key transferable Attributes, Skills, and Knowledge that are embedded within curriculum, developed gradually towards successful measures and interlinked with cross-discipline and Co-operative Learning opportunities. *One or more FEDTASK, transferable Attributes, Skills or Knowledge must be evident in the specified learning outcomes and assessment for each FedUni Unit, and all must be directly assessed in each Course.*

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 1 Interpersonal	Students will demonstrate the ability to effectively communicate, inter-act and work with others both individually and in groups. Students will be required to display skills in-person and/or online in: <ul style="list-style-type: none"> <li>• Using effective verbal and non-verbal communication</li> <li>• Listening for meaning and influencing via active listening</li> <li>• Showing empathy for others</li> <li>• Negotiating and demonstrating conflict resolution skills</li> <li>• Working respectfully in cross-cultural and diverse teams.</li> </ul>	Not applicable	Not applicable
FEDTASK 2 Leadership	Students will demonstrate the ability to apply professional skills and behaviours in leading others. Students will be required to display skills in: <ul style="list-style-type: none"> <li>• Creating a collegial environment</li> <li>• Showing self -awareness and the ability to self-reflect</li> <li>• Inspiring and convincing others</li> <li>• Making informed decisions</li> <li>• Displaying initiative</li> </ul>	Not applicable	Not applicable

FEDTASK attribute and descriptor		Development and acquisition of FEDTASKS in the Unit	
		Learning Outcomes (KSA)	Assessment task (AT#)
FEDTASK 3 Critical Thinking and Creativity	<p>Students will demonstrate an ability to work in complexity and ambiguity using the imagination to create new ideas. Students will be required to display skills in:</p> <ul style="list-style-type: none"> <li>• Reflecting critically</li> <li>• Evaluating ideas, concepts and information</li> <li>• Considering alternative perspectives to refine ideas</li> <li>• Challenging conventional thinking to clarify concepts</li> <li>• Forming creative solutions in problem solving.</li> </ul>	S2, A2	AT2
FEDTASK 4 Digital Literacy	<p>Students will demonstrate the ability to work fluently across a range of tools, platforms and applications to achieve a range of tasks. Students will be required to display skills in:</p> <ul style="list-style-type: none"> <li>• Finding, evaluating, managing, curating, organising and sharing digital information</li> <li>• Collating, managing, accessing and using digital data securely</li> <li>• Receiving and responding to messages in a range of digital media</li> <li>• Contributing actively to digital teams and working groups</li> <li>• Participating in and benefiting from digital learning opportunities.</li> </ul>	K1, K2, K3, K4, K5, K6, S1, S2, A1, A2	AT1, AT2, AT3, AT4
FEDTASK 5 Sustainable and Ethical Mindset	<p>Students will demonstrate the ability to consider and assess the consequences and impact of ideas and actions in enacting ethical and sustainable decisions. Students will be required to display skills in:</p> <ul style="list-style-type: none"> <li>• Making informed judgments that consider the impact of devising solutions in global economic environmental and societal contexts</li> <li>• Committing to social responsibility as a professional and a citizen</li> <li>• Evaluating ethical, socially responsible and/or sustainable challenges and generating and articulating responses</li> <li>• Embracing lifelong, life-wide and life-deep learning to be open to diverse others</li> <li>• Implementing required actions to foster sustainability in their professional and personal life.</li> </ul>	Not applicable	Not applicable

**Learning Task and Assessment:**

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1, K2, K3, S1, A1, A2	Understanding of signal propagation, analysis of wireless architectures, and use cases of enabling wireless technologies for various applications.	Quizzes/Assignment / Project	60-80%
K1, K2, K3, K4, K5, K6, S2, A1	Students will provide theoretical answers and provide practical solutions to a range of questions and problem types drawn from theory, laboratory tasks and examples used during this unit.	Final Test(s)	20-40%

**Adopted Reference Style:**

APA

Refer to the [library website](#) for more information

Fed Cite - [referencing tool](#)