College of Science and Technology

African Center of Excellence in Internet of Things (ACEIoT)

P.O.BOX BP 3900, Kigali

Master of Science in Internet of Things: Wireless Intelligent Sensor Networking (MSc in IoT-WISeNet)

PROGRAMME SPECIFICATION

(August, 2017)

Master of Science in Internet of Things: Wireless Intelligent Sensor Networking
(MSc in IoT: WISeNet)

1. PROGRAMME DETAILS

The table in this section sets out the programme details. It shows the title, which is also the highest qualification obtainable from the programme. The title was selected with the aim to make the programme look both academically sound and useful for employment. In addition, in the table we specify the exit awards, the mode of attendance and the resource group. For the resource group in particular, we opt a part classroom/part laboratory. According to the National Qualification Framework, such a class corresponds to category 5 with a staff/students ratio of 1:14.

<table>
<tr><td>1.1 Programme Title</td><td colspan="4">Master of Science in Internet of Things: Wireless Intelligent Sensor Networking (MSc in IoT:WISeNet)</td></tr>
<tr><td>1.2 Exit Awards</td><td colspan="4"><table><tr><td></td><td>Credits</td></tr><tr><td>Master of Science in IoT: Wireless Intelligent Sensor Networking (MSc in IoT: WISeNet)</td><td>240</td></tr></table></td></tr>
<tr><td rowspan="3">1.3 Modes of Attendance</td><td>Part-time</td><td></td><td>Full-time</td><td>X</td></tr>
<tr><td>Distance Learning</td><td></td><td>Work-based Learning</td><td></td></tr>
<tr><td>Other (please specify)</td><td></td><td>Short course</td><td></td></tr>
<tr><td rowspan="4">1.4 Resource group</td><td>1</td><td></td><td>5</td><td>X</td></tr>
<tr><td>2</td><td></td><td>6</td><td></td></tr>
<tr><td>3</td><td></td><td>Other (write in)</td><td></td></tr>
<tr><td>4</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">1.5 First year of presentation</td><td colspan="3">2017 (1st Presentation)</td><td>X</td></tr>
<tr><td colspan="3"></td><td></td></tr>
<tr><td>1.6 Programme Leader</td><td colspan="4">Santhi Kumaran, Director, ACEIoT</td></tr>
</table>

1.7 Programme Development Team

Name	**School/Institution**
Prof. Santhi Kumaran(Chair)	ACEIoT, UR-CST, Rwanda
Dr. Damien	ACEIoT, UR-CST, Rwanda
Dr. Luc Ngend	School of ICT, UR-CST, Rwanda
Dr. Richard Musabe	School of ICT, UR-CST, Rwanda
Dr.Said RutabayiroNgoga	School of ICT, UR-CST, Rwanda
Dr.GauravBajpai	School of Engineering, UR-CST, Rwanda

Dr. Marco Zennaro	International Center of Theoretical Physics (ICTP), Italy
Prof.Raja Datta	Indian Institute of Technology (IIT), Kharagpur, India
Prof. Martin Saint	Carnegie Mellon University (CMU)-Africa
Dr.ChomoraMikeka	University of Malawi (UNIMA), Malawi
Dr. Jimmy Nsenga	CETIC, Belgium
Mrs. Didacienne Mukanyiligira	ACEToT, UR-CST, Rwanda

1.8 School/Centre Administratively responsible for the Program	African Center of Excellence in Internet of Things (ACEIoT)

2. PROGRAMME FUNDING AND NEED FOR RESOURCES

2.1 Programme Development Team

The team is composed of the Programme Leader and six academic staff from UR-CST and regional and international experts from Research labs and Universities (ICTP Italy, CETIC Belgium, IIT Kharagpur-India and UNIMA Malawi, CMU-Africa) who were involved in the writing and planning of the module descriptors. Also included were representatives from private and public sector such as RISA, MYICT, HeHe labs ltd..The Programme leader who is also the Director of the ACEIoT will be present throughout the planning process, including the validation meetings.

2.2 Students numbers:

Intake per year into Level 6: 15 students/specialization
Eventual population, all years: 30 students

2.3 Adequacy of Infrastructure

The programme will be resourced from the existing resources of the College of Science and Technology Campuses. The classrooms and computer laboratories are adequate for the program. Two special state of art laboratories (Wireless Intelligent Sensor laboratory and Embedded Computing Systems laboratory) including a mini fab lab will be set up by the ACEIoT –World Bank funds.

2.4 Adequacy of Staff Resource

Here the numbers and level of staff working on the programme in each year are given with the objective to show how the staff resource is adequate in terms of numbers and seniority as well as to cost the programme in financial terms. The staff figures given in the table are full time equivalents.

Year	2017/18	2018/19	2019/20	2020/21	SOURCE OF FUNDS
Academic Staffing					
Full professors	0	1	1	2	UR/ACEIoT
Associate professors	1	2	3	4	UR/ACEIoT
Senior lecturers	2	4	5	6	UR/ACEIoT
Lecturers	3	4	5	6	UR/ACEIoT
Support Staff	4	4	6	8	UR/ACEIoT
Technical & Other Staff	2	2	2	2	UR/ACEIoT

2.5 General accommodation requirements

The figure in this section serves to give an idea on the number and size of rooms that will be needed by the programme.

- Two classrooms and two computer laboratories for at least 30 students are available.
- Students will, however, be encouraged to bring their own devices (BYOD), thus enabling them to access online materials and lectures.

3. PROGRAMME AIMS AND RATIONALE

This program specification has been produced to conform to the Rwandan National Qualifications Framework for Higher Education Institutions. Use has also been made of the ITU Post Graduate Course in Internet of Things to ensure that the proposed curriculum meets International Standards.

3.1 Programme Rationale

To improve capabilities for innovation and higher productivity and to become globally competitive we should invest in higher education and training in Science Technology and Innovation (STI). The latest ICT technologies such as Internet of Things (IoT) have the potential to revolutionize science and transform lives through environmental management, monitoring and control by remote sensing, agriculture, health equipment, automation in e-governance, tourism, networking, security, software developmentand will greatly improve service delivery in all sectors. This will create more jobs and reflect into socio-economic development.

There is scarcity of trained personnel in the IoT domain in the East and South African (ESA) region who can work towards development of new innovative approaches and solutions, focusing on low-cost, open and sustainable solutions. Therefore, the main development challenge is to build a critical mass of African scientists and engineers in the field of IoT through higher education, research and training. Rather than addressing a specific development challenge, IoT focuses on the underlying technological framework for all development challenges. For example to list few, IoT devices can greatly benefit farmers to monitor irrigation and to predict water

necessities based on temperature, humidity, soil moisture and light readings; would be the best monitoring tool for disaster management; could be used as patient vital sign monitoring and scheduling device in rural and remote health centers; and to monitor real-time data such as the state of batteries, the usage of energy , the status of the panels allowing for the dynamic exchange of energy among users.

IoT is a multidisciplinary field and the two main focus directions are Wireless Sensor Networking and Embedded Computing Systems. Hence, we propose a Master's program in Internet of Things in Wireless Intelligent Sensor Networking under the African Center of Excellence in Internet of Things (ACEIoT) to educate and train African researchers in the field of IoT. There is another Master's program also under the ACEIoT focusing in Embedded Computing Systems. Both programmes have five modules of 50 credits out of the 240 credits in common and are core compulsory modules of the Masters in IoT program. Both programmes therefore has 28.83% of the content in common. These modules introduce the whole area of the Internet of Things and explain its relevance and importance. This background will be instrumental for the student to undertake the other specialized modules focused to Wireless Intelligent Sensor Networking field. They ought to understand the flow of the modules in each option, and the expected learning outcomes.

As ACEIoT is a collaborative Project with Regional and International partners from Academia, Industries and Research Institutions funded by World Bank to build STI capacity in the ESA region, these Masters programs will be targeting students from within the country Rwanda and to the students from the ESA region.

The Master of Science in IoT-Wireless Intelligent sensor Networking (MSc in IoT-WISeNet) apart from teaching the ever-increasing importance of sensor technology in today's information society, it will also focus on how traditional telecommunication infrastructures are migrating to internet-based architectures and protocols. Also the program will cover the key aspects of the current and evolving internet standards, cyber-physical systems, smart devices, sensors and actuators and Sensor Networking and Protocols, and drones for data acquisition. The student would acquire wide knowledge within the area of communications in wireless sensor networks, as well as, deep knowledge and practical skills in the development of communication protocols, programming the sensors and problem solving skills for wireless sensor network systems. This program covers aspects from the physical up to the application layer as well as selected aspects of Security in relation to wireless sensor networks. As sensor networks and applications become increasingly intelligent, the need intensifies to process greater amounts of data. More and more products are being connected to a central network for data collection, system monitoring, and control. Therefore, this program also concentrates on modules offering knowledge about Intelligent data processing and Cloud Networking for IoT (CN4IoT).

Research Seminar: Every module will have a component called Research Seminar. The seminar topic relates to the content of the study course. The students work on the topic on their own, present it for discussion.

The projects are a major part of the programme. They are designed to enable students to demonstrate their skills and ability to solve real-life problems while gaining more detailed knowledge of a particular topic. Projects should be simulation-based or experimental. In all cases, students are expected to show innovation and an ability to come up with own solutions.

3.2 Educational Aims

The main thematic basis of the programme is to provide students the basic skills needed for the development of intelligent sensors that process, store, and learn from data so as to improve their ability to gather information over time. Broader impacts include more effective and reliable use of sensors for problem-solving in the area of Agriculture, Health, Energy, Education etc.
The programme has the following educational aims:

- To provide the students practical exposure to different types Sensors, Actuators, and Programming of Sensor network nodes.
- To enable students to model, simulate, predict and assess the performance of communications over Wireless Sensor Networks;
- To provide more hands-on sessions for the implementation of small-scale applications of wireless sensor network by the student teams;
- To expose students to a wide range of testbeds available for projects, such as Internet technologies, wireless networking, network management and control, and Internet of Things (IoT) applications;
- To develop a broad technical understanding of the IoT technologies applied for development & business in a real world perspective;
- To develop communication, interpersonal, and team building skills.

4. PROGRAMME LEARNING OUTCOMES

A. Knowledge and Understanding

At the end of the programme students should be able to demonstrate knowledge and understanding of the:

A1. Concepts of sensors and actuators, protocols, networking aspects and delivery platforms of IoT systems and regulatory aspects of IoT systems
A2. Programming aspects of the WSN and Intelligent Smart devices, selection of appropriate platforms for the building a WSN.
A3. Principles of IoT business and requirements to start an IoT business and its legal implications;
A4. Middleware components at a specialist level and the protocols used at the various layers of the IoT architecture;

A5. Concepts of security, privacy and ethics in IoT domain and to design and develop smart authentication and security systems;
A6. Ethical and security implications of data collection and technical risk assessment of WSN, data storage and processing;
A7. Concept of future 5G wireless communication networks and the architectures and how IoT can benefit from future communication technologies;
A8. Concepts of Cloud Computing, C4IoT, Infrastructure, Platforms and Software, Policies and Regulatory aspects;
A9. The use of UAVs for data collection and the latest laws and regulation pertaining to UAVs;
A10.Research methodology involving WSN analytics and identification of business IoT based applications in the region.

B. Cognitive/ Intellectual Skills/ Application of Knowledge

At the end of the programme students should be able to:

B1. Critically analyse IoT use cases and apply appropriate technologies for innovative designs of IoT system solutions;
B2. Program wireless sensor nodes/networks (WSN) and to develop intelligent algorithms;
B3. Design and develop wireless sensor networks protocols and efficient routing algorithms for wireless sensor networks (WSN);
B4. Use IoT in the development of solutions to problems in business; start and grow small business;
B5. Apply knowledge of WSN architecture and protocols in the development of solutions to problems in field of Agriculture, Health, Energy etc.;
B6. Apply authentication algorithms and Integrate security aspects in the development of innovative IoT solutions;
B7. Critically analyse and evaluate the strengths as well as weaknesses of different types of cloud computing architectures and able to select appropriate cloud networking set up for IoT applications;
B8. Apply the knowledge, the know-how and the interpersonal skills they have acquired during their Internships;
B9. Deploy research methodology that critically reflect on scientific research on Wireless Sensor Networks;
B10. Use drones as an access point and for data collection from sensors.

C. Communication/ICT/Numeracy/Analytic Techniques/Practical Skills

At the end of the programme students should be able to:

C1. Undertake testing of design ideas of IoT systems in the laboratory or by simulation, and analyse and critically evaluate the results;
C2. Manage a WSN installation project using appropriate IoT protocols and standards.

C3. Use software demonstrate practical applications of WSN and apply knowledge of IoT to transforming existing business;
C4. Critically evaluate the designed cloud networking for IoT and apply extensive hands-on application development skills in building a multi-tiered Cloud-based IoT system taking into account privacy/security issues;
C5. Use software to demonstrate the application of UAVs in the society and show competence of techniques in construction of UAVs.
C6. Communicate scientific research outputs among the relevant stakeholders and IoT research community;

D. General transferable skills

At the end of the programme students should be able to:

D1. Apply smart sensors and actuators to solve community based problems in the field Agriculture, Energy, Health etc.;
D2. Walk through current and future deployment of 5G; discuss and select its architecture design suitable for the IoT systems;
D3. Start your own businesses and communicate effectively (written, verbal drafting, sketching etc.) in presenting an IoT business plan, business reports and market analysis reports;
D4. Create awareness about the usefulness of IoT technologies and demonstrate problem solving skills using IoT techniques;
D5. Efficiently disseminate scientific research findings within the community and outside, to the research sphere for inter-disciplinary cooperation for increased visibility;

5. PROGRAMME STRUCTURE

Students are required to obtain 240 credits as stated in "Rwandan National Qualification Framework for Higher Education Institutions". Duration of the programme is two academic year. As specified in "Rwandan National Qualification Framework for Higher Education Institutions", the academic year will be divided into four semesters of 15 weeks each. A semester will consist of twelve weeks of learning and teaching, one week for revision and consolidation and two weeks during which examinations etc. take place. Academic work and assessments will be carried out within the month in which the module is taught and completed.

Semester I (January-June)					
Module Code	**Module**	**Contact Hours**	**Credits**	**Level**	**Achievement of Programme Outcomes**
IOT6161	FUNDAMENTALS OF INTERNET OF THINGS	36	10	6	A1, A3-A5, B1, B3, B4, B7, C1, C2, C5, C6, D1, D4, D5

IOT6162	SMART SENSORS & ACTUATORS	36	10	6	A1-A5,B1-B4,B7,C1-C3,C5,C6,D1,D4, D5
IOT6163	WIRELESS SENSOR NETWORKS	36	10	6	A1-A5,B1-B4,B7,C1-C3,C5,C6,D1,D4, D5
IOT6164	DESIGNING AND PROGRAMMING EMBEDDED DEVICES	36	10	6	A1,A2,A4,A5,A7,B1-B3,B5,C1-C3,C5,C6, D1,D2,D4,D5
IOT6165	IoT ENTERPRENEURSHIP	36	10	6	A1-A3,A7,A8,A10, B1, B4, C1, C3, C5, C6, D1, D3, D4, D5
IOT6166	RESEARCH METHODOLOGY	36	0	6	A1,A2,A10,B1,B2,B9,C1,C2, C6,D1,D4,D5
Semester II (July-December)					
Module Code	**Module**	**Contact Hours**	**Credits**	**Level**	**Achievement of Programme Outcomes**
WSN6261	IoT ARCHITECTURE, PROTOCOLS AND STANDARDS OF WSN	48	15	6	A4,A7,A10,B3,B4,B5,C1,C2, C6,D4,D5
WSN6262	SECURITY, PRIVACY AND ETHICAL ASPECTS OF WSN	48	15	6	A4,A5,B4,B6,B9,C1,C4,C6, D1,D4,D5
WSN6263	ADVANCED WSN DESIGN IN 5G	48	15	6	A4,A7,A10,B1,B4,B5,C2,C3, C6, D1,D2,D4,D5
WSN6264	CLOUD NETWORKING FOR IoT	48	15	6	A1,A8,A10,B1,B3,B7,C1,C4, C6, D3,D4,D5
WSN6265	APPLICATIONS OF UAV IN IoT	36	10	6	A2,A9,A10,B1,B3,B10,C1,C5 ,C6, D1,D4,D5
Internship will start immediately after the End of the Last Module in Semester II (January to March) Project work will start from April to November (Semester III and IV)					
WSN63601	FIELD ATTACHMENT	72	20	6	B1,B2,B4,B8,C1,C2,C3,C5,D 1,D2, D3,D4
WSN64602	MASTER'S DISSERTATION	360	100	6	A1, A2, A4, A6,A7, A10, B1, B2, B3, B4, B9, C1, C2, C3, C5, C6,D1, D2, D4, D5
	Total	**858**	**240**	**6**	

Program Learning outcomes mapping

Semester I (January 2018-June 2018)																																
Module Code	Module	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5
IOT 6166	Research methodology	√	√				√			√	√	√	√					√		√		√		√			√	√	√	√	√	√
IOT 6161	Fundamentals of Internet of Things	√	√	√	√							√		√	√					√		√	√	√			√	√		√	√	√
IOT 6162	Smart Sensors & Actuators	√	√	√	√						√	√	√	√	√	√				√		√	√	√			√	√			√	√
IOT 6163	Wireless Sensor Networks	√	√	√	√						√	√	√	√	√	√				√		√	√	√			√	√			√	√
IOT 6164	Designing and Programming	√	√		√						√	√	√	√		√						√	√	√			√	√		√	√	√
IOT 6165	IoT Enterpreneurship	√	√	√			√				√	√			√	√						√	√	√				√		√	√	√
Semester II (July 2018-December 2018)																																
Module Code	Module	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5
WSN 6261	IoT Architecture, Protocols and				√			√			√			√	√	√						√	√				√				√	√
WSN 6262	Security, privacy and ethical aspects of IoT				√	√									√		√			√		√			√		√	√			√	√
WSN 6263	Advanced Wireless IoT Design in 5G				√			√			√	√			√	√							√	√			√	√	√		√	√
WSN 6264	cloud networking for ioT	√							√		√	√		√				√				√			√		√			√	√	√
WSN 6265	Applications of UAV in IoT		√							√	√	√		√							√	√				√	√	√			√	√
Semester III & IV (January 2019- December 2019)																																
Module Cod	**Module Name**	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5
WSN 6361	Field Attachment											√	√		√		√	√	√			√	√		√	√		√			√	√
WSN 6461	**Dissertations/ Project**	√	√				√		√		√	√	√	√	√					√		√			√		√	√			√	√

6. LEARNING AND TEACHING STRATEGY

We follow a module based teaching approach and modules will be offered in a carefully orchestrated instructor-led teaching, e.g. as a full-time, five-days a week, lecture-based classroom presentation. This could be followed by three weeks of instructor-led e-learning with self-study of reference materials (primary documents whenever possible). At the end of the final week, an interactive seminar should be held to enable students to strengthen their knowledge and understanding by discussing and resolving problems based on real-life situations. All modules might benefit from exploiting different delivery modes adapted by the Lecturer.

For example, the time allocated to a module might be divided between:
• Classroom teaching and physically attended seminars and workshops.
• Case studies and practical exercises which should be included in all modules.
• Instructor-led remote lectures (live or pre-recorded in some cases).
• Self-study of textbooks and reference material.
The 10/15 credits modules will be taught within four and five weeks respectively. Research methodology which is a zero credit that shall be taught in two weeks, the internship will span over a period of 2 to 3 months and the project shall span for over a period of six to eight month with supervision and no classroom teaching until otherwise advised by supervisor in advance.

Category 1: Theory with No credits module

1) Only 36 hours of lectures shall be provided with a significant assignment in built to pass. The basic strategy is to encourage students to work independently.

Category 2: Theory course with Practical's or 10/15 credit modules

1) 36/48 contact hours (lectures, tutorials, discussions, seminars, case studies etc.)
2) 26/42 hours of self study
3) 38/60 hours' work on written assignments, practical's and mini project (mandatory)

Category 3: Field Attachment with 20 credits

Field & Supervised Learning: 200 hours total consisting of 176 hours (22 working days) of field placement and 24 hours Report Writing

Category 4: Master's Thesis/Dissertation with 100 credits

1000 hours of practical work includes field survey and all previous modules to be passed as the project carried out shall involve the requirement / design / analysis / testing / maintenance /etc. provided in all modules taught in semester I & II to link up to a particular working project at the end of this module with Practise oriented to Students thesis.
Note*
(The meaning is the student shall be provided tentatively a research project after IOT6166 Research Methodology module, which has to be, carried forward with all other modules as assignment or mini project whatever is applicable depending on theoretical or practical nature of the modules)

7. ASSESSMENT STRATEGY

The module evaluation will be based upon individual assessment submitted by Lecturer at the end of the module. The special tools/software's and strategies will be used to avoid plagiarism, cheating and other malpractices. The specific marking criteria for each module will be provided in individual module descriptions. The Final Exam shall be of 2.5 hours following general masters programme format as already followed. A tentative guide is provided for lecturer to use for continuous assessment but may vary with different module but at least 4 different elements shall be covered.

Category 1: Theory with no credits module

Only class assignments to be marked during lecture to pass

Category 2: Theory course with Practical's or 10/15 credit module

The Final assessment shall include 60% of continuous and 40% of End of Module assessment.
The assessments shall be made 50% each for practical and theoretical aspects. A completed module will be considered passed only if a minimum score of 60 % or above is achieved during evaluation.

For Example:

One quiz (5%), one/two practical assignment (10%), one research seminar or mini project for presentation (20%), one tutorial session (5%), short practical test (10%) and a short written test (10%) followed by final assessment (40%) of End of Module Examination divided equally into practical viva-voce and theoretical examination.

Category 3: Field Attachment with 20 credits

1 reports by the student;
Evaluations of the professional and social skills of the student by the company/ project supervisor (intermediary and final evaluation);
Copy of the work certificate from the company

Category 4: Master's Thesis/Dissertations with 100 credits

The final projects/dissertations will be evaluated by a written report, presentation and oral examination by the external examiner(s) during the Project Defence. The guidelines shall be provided during IOT6166 module.

• Examination.

An examination could be used to assess a complete module, especially the Foundation modules where students are either physically present face-to-face or electronic (on-line) tools can be used. However, this method may not be flexible enough to cover Advanced modules, where understanding demonstrated through projects and exercises will be much more important.

• Essays.

An essay can be used to demonstrate a student's understanding of the content of a particular module. This would demonstrate a student's ability to assimilate a subject in depth and objectively analyse the material that has been provided. However, marking of essays can be time consuming for the course tutor and lead to a degree of subjective assessment which depends, for example, on the student's knowledge of English rather than on their level of knowledge of the subject.

• Projects.
A project can be set which requires the student (or a group of students) to research a subject in more depth than has been provided on the course. The thoroughness with which a project has been completed and the adequacy of the results obtained could be an excellent way to assess whether a student has fully understood the concepts and methods used in the module. Ideally, around 50% of the marks for a particular module should be based on the results of projects or interactive exercises if these can be set in the required context and timescale.
• Research Seminars.
Every module will have a component called Research Seminar. The seminar topic relates to the content of the study course. The students work on the topic on their own, present it for discussion.
• Interactive exercises.
These can be a fun way of quickly allocating marks to a student or a group of students. A problem can be outlined and the student or group of students asked to work out the best way of solving it (e.g. how to design an IoT regulation in a national context). Enough scope should be given to allow the student to come up with innovative ways of solving the problem.

8. STUDENT PROFILE

This Masters (MSc in IoT-WISeNet) could be taken by any professional who has previously graduated with a first-level University degree (e.g. BSc) in the field of ICT.
Prospective candidates for the programme will include

i) Fresh graduates with relevant ICT degrees with Second Class Honors Upper Division and above
ii) Non ICT professionals should have at least 2 years of working experience in the ICT related field. They shall be required to complete at least four pre-requisite modules of bachelors programme as given in section 9.

9. SPECIFIC ADMISSION CRITERIA

The minimum entrance requirement to MSc in IoT-WISeNet Programme at UR-CST is a Bachelor Degree with Second Class Honors Upper Division. The program designed for anyone wishing to enhance their professional knowledge in the field of Io with WISeNet specialization, for example:
- Electronics engineers
- Telecommunications engineers
- Computer scientists
- Policy makers and Regulators
- Telecom Operators
- Networks Operators

Students with non-technical Bachelor degrees should have atleast two years minimum experience in the ICT field (in relevant ICT Departments or Directorates) and have to take at least four pre-requisite courses: 1) Computer Networking 2) Internet Technologies 3) Web Technologies 4) Database Systems. Each case however will be considered individually and other pre-requisite courses might be proposed to the potential candidates.

10. STRATEGY FOR STUDENT SUPPORT

Each student will be allocated to a supervisor. The students will meet their supervisors on the regular basis in the face-to-face mode (in the case of local lecturers) or in the blended mode - face-to-face and communication through Internet (in case of visiting lecturers). The meetings will take place at least once a week with record keeping as per UR/CST guidelines.

In case of a suspected conflict, bias, discrimination, harassment or any other issues, students are advised to address the Head of Department or the Programme Coordinator. Alternatively, the Director of Research and Postgraduate Studies (DRPGS) shall serve the final verdict in case of any disputes after seeking prior order from the higher authorities being well informed on any such instance if it occurs on individual basis.

All students will be provided with study materials, assignments, exercises, necessary guidelines, templates and supplementary materials. Those materials will also be posted on e-learning systems of UR/CST. Students will be given an opportunity to interact with lecturers through communication tools embedded into the e-learning system currently under progress.

11. PROGRAMME-SPECIFIC NEED FOR RESOURCES AND UNUSUAL DEMANDS ON UNIVERSITY RESOURCES

In UR-CST currently there are a number of scholars possessing academic qualifications (PhD) and expertise in the relevant areas (namely Wireless Communications and Information Technology). There are ten (10) PhD holders with relevant areas of expertise lecturing/c-lecturing on this programme. There will be experts from our partner Institution of ACEIoT such as ICTP Italy, CETIC Belgium, IIT Kharagpur-India and UNIMA Malawi, SUZA –Zanzibar, CMU-Africa and much more.

For each module the space required includes one lecture room accommodating 15 students or one computer lab with 15 computers. Dedicated Masters' classroom and 2 dedicated labs with 30 computers each are available at UR-CST with the needed LCD projector, smart board, printer and scanner.

12. STRATEGIES FOR CONTINUOUS ENCHANCEMENT AND FUTURE DEVELOPMENT

At the end of each module students will be given evaluation forms and requested to give their feedback on teaching and course content. The student evaluation of modules as well as their performance will be a subject of the discussion on the programme review meeting at the end of the academic year. This may involve changes to the content and timing of the module, the sequence of module delivery, prerequisite courses, the methods of teaching, learning and assessment, and, in some cases, replacement of lecturers/ teaching assistants.

13. STAFF DEVELOPMENT PRIORITIES

Visiting lectures will be invited to boost up manpower in case local staffs are insufficient to handle any of the modules in the programme. The members of the academic staff in the department with relevant Masters degrees acting as Teaching Assistants will under study the local and visiting lecturers, thus building their academic capacity. All academic staff on the programme to pursue higher academic qualifications.

14. PROVISIONAL APPROVAL

Members of Approval Panel

Role/ Location	Dean /Director	Date
1 Principal	Signature	
	Print Name	
2 Director	Signature	
	Print Name	
3 Master's Coordinator	Signature	
	Print Name	
4	Signature	
	Print Name	
5	Signature	
	Print Name	
	Print Name	

Seen and noted

Library	Signature	
	Print Name	
ICT	Signature	
	Print Name	
Quality Office	Signature	
	Print Name	
Finance	Signature	
	Print Name	