

Proposal for Dual Degree programme - Master of Science (MS) in “New Generation of Electronic Component Base” offered by CUSAT in collaboration with Saint Petersburg ETU LETI, Russia

1. Introduction

Cochin University of Science and Technology is set to make a paradigm shift in the education sector through its dual degree programme. This gives enrolled student an opportunity to acquire international degree and to embrace the benefits of world-renowned international lab facilities. Dual degree programme enables the students to realise the dream of international degree with minimum financial burden. Additionally, dual degree offers two degrees for the same course—from CUSAT as well as collaborating international University. This ensures validity of the degree world wide without the barrier of continents.

The program is proposed by the consortium of four departments namely: Division of Electronics Engineering, School of Engineering; Department of Physics, Department of Instrumentation and Department of Electronics. Coordination of the course will be done by the Division of Electronics Engineering, School of Engineering.

2. Our Overview

Cochin University of Science and Technology has more than 50 years of experience in moulding young generation into highly successful scientists and several entrepreneurs. We have experienced faculty in diverse domains with expertise in latest technologies in all branches of engineering. The University is committed to enlightening the student and the teacher through continuous learning and knowledge sharing.

2.1 Vision

Our vision is to become an engineering educational institution of international standing by striving continuously in pursuit of excellence in education, research, entrepreneurship and training. We are also committed to serve mankind through technical services to the society.

2.2 Mission

We stand for a creative balance of academic and professional activities. We also maintain a mutually beneficial partnership with reputed educational institutions and industry. In this regard, we are coming forward to collaborate with international/ national institutions which can be instrumental in reaching the goal of excellence in academics.

3. Motivation behind the Master of Science (MS) programme in association with Saint Petersburg Electro Technical University –LETI

Saint Petersburg Electro Technical University –LETI, is a highly renowned university with QS world ranking within 700 and the Nobel prize winning lab team. ETU LETI is willing to collaborate with CUSAT to offer a Master of Science (MS) (named as Double Degree programme by ETU LETI) in “New Generation of Electronic Component Base”.

The technology is growing and moving at a fast pace such that no educational institution can walk along. However, industry always expect educational sector to mould the students and deliver them industry ready students who can work worldwide. This becomes huge challenge to every institution. All over the world, this impossible challenge is accepted by reputed educational institutions and joined hands with like-minded institutions to share their knowledge and resources for betterment of students. The proposed collaboration with ETU LETI will

provide our students a rare chance to work and train under Nobel laureate team and well established labs.

Semiconductor industry is undergoing a rapid growth in India and several industries have sprung up to achieve self-sufficiency in this sector. This will in turn create a lot of opportunities within India in the field of semiconductor. Till now, our students had nearly nil chance to work in semiconductor labs due to dearth of labs, which in turn makes them inexperienced and unfit for semiconductor industry. The proposed course intends to mitigate this issue as the curriculum formulated is of high level and in line with the latest technology. If we have to train our students to this standard, the investment required would be huge. The dual degree gives students chance to work in the state of the art labs and without much financial burden. Since, the first year is spent in CUSAT, expense is halved and also the dual degree concept provides them the advantage of acceptance of degree worldwide without the barrier of continents. The course is open to students who have completed B. Tech in Electronics and Communication, Electrical and Electronics, Instrumentation and MSc in Physics, Electronics, Photonics and Instrumentation. The number of students proposed to be admitted to the course is '15' as per MoA.

4. Programme

Students enrolled in a Master of Science (MS) Degree Program under this Agreement will study at both institutions according to the curriculum defined in Annexure and Annexes. Upon successful fulfilment of the program and all degree requirements at each institution, the students from LETI and from CUSAT may be granted academic degrees from both institutions.

Subject to a mutual evaluation of the partner institution's standards for accreditation by both Parties, some of the credits earned from the host university will be accepted as equivalent to those attained through agreed/selected courses offered by the home university, and some credits earned from the home university will be accepted as equivalent to those attained through agreed/selected courses offered by the host university.

5. Programme Objectives and Focus of Interest

Programme Objectives (SOE, CUSAT)	Focus of Interest (ETU LETI)
<ul style="list-style-type: none"> • Have a degree of mastery and in-depth knowledge in Micro and nano electronics, Semiconductor technology and Integrated circuits. • An ability to independently carry out research /investigation and development work to solve practical problems. • An ability to write and present a substantial technical report/document. • Identify, analyze, and solve problems related to Micro and nano electronics, Semiconductor technology and Integrated circuits • Have theoretical and practical knowhow for topological design of semiconductor devices, elements of integrated circuits, as well as the study and development of basic and advanced technologies for the production of modern integrated circuits. 	<p>This program focuses on the design and creation of modern electronic component base elements and in particular:</p> <ul style="list-style-type: none"> • Basic technological routes and parameters of technological processes of production microelectronic products; • Basics of material science of semiconductors and heterostructures; • Types of defects in the production of microelectronic products; • Basic technological equipment, control-measuring and auxiliary equipment for production of microelectronic products and principles of its work; • Design of devices, appliances and systems of electronic technics taking into account the given requirements;

<ul style="list-style-type: none"> • Have an ability for lifelong learning with high level of professional and intellectual integrity. 	<ul style="list-style-type: none"> • Characteristics of modern CAD systems for microelectronics and methods of solving problems of technological and circuit design of electronic components base.
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6. Selection Procedure in brief

Both institutions guarantee that the candidates selected for a Master of Science (MS) Degree Program will be deemed to be of an appropriate caliber and will possess appropriate academic qualifications. Applications are evaluated first by the home institution and then presented to the host institution for review and approval. It is proposed that the candidate shall have passed B.Tech/ BE/ AMIE/ AMIETE Degrees in Electronics & Communication / Electrical and Electronics/ Electronics and Instrumentation / Applied Electronics and Instrumentation branch or M.Sc in Physics/ Photonics / Electronics from any University in Kerala or an Examination of any other University/Institution accepted by this University as equivalent thereto with a minimum of 70% marks or 7.5 CGPA on a scale of 10. Preference will be given to GATE qualified candidates and in the absence of adequate number of GATE qualified candidates, selection will be based on Departmental Admission Test conducted jointly by the involved departments in CUSAT.

Detailed selection procedure is included in Annexure I.

6.1 Number of Students on Exchange

The maximum number of Master of Science (MS) Degree students to be enrolled is 15 per year.

6.2 Status of Participating Students

Students enrolled in a Master of Science (MS) Degree Program will be enrolled at both institutions, and will be entitled to the facilities and services offered by both institutions. Students will be subject to all relevant regulations, codes of practice and procedures at both institutions, and will confirm their agreement to abide by those terms upon registration at each institution.

7. Degree Requirements

7.1 Students enrolled in a Master of Science (MS) Degree Program are expected to complete all required coursework, research project, research report, dissertation and any other work necessary subject to the rules and regulation set by both CUSAT and LETI to satisfy the requirements of their Masters of Science (MS) program at both Universities.

7.2 The parties agree that the details of the Degree Requirements shall be further agreed and defined in Annexure and Annexes for the program.

7.3 Students who complete the requirements will be awarded degrees separately by both universities, in accordance with the relevant regulations in force in each country and based on the conditions established by the two Parties for students of the Master of Science (MS) Degree Program. Both Parties will provide each other with all relevant official documents related to academic regulations. If any change occurs in the regulations which affects the Master of Science (MS) Degree Program and/or the participating students, both Parties are obliged to notify in writing the partner institution as soon as possible and become part of this Agreement. If any issue should arise from said changes, both parties will endeavour to seek a congenial resolution.

8. Fee structure

After survey of similar programmes offered by reputed institutes and ensuring avoidance of over pricing, the following fee structure is proposed.

For first year in CUSAT: Rs. 87,000/- per semester

For second year in ETU LETI, Russia: 1.3 lakh rubbles per semester and living expenses extra (detailed calculation of fees in CUSAT is attached). There will be a registration fee of Rs. 10,000/- in CUSAT for third and fourth semesters. ETU LETI has offered complete fee waiver to a maximum of 3 extendable up to 5 students who are acquiring qualifying degree from CUSAT and applying for the course while in their final semester.

The proposed fee calculation is done such that course is financially viable with a minimum of ten students. Fee structure is proposed as per Annexure II. Syndicate may take action accordingly.

9. Terms and Conditions

9.1 Payments

First year fee payment is to be done to CUSAT. A separate head of account is appreciable for any international collaboration course offered by CUSAT henceforth. It is difficult for any single department to conduct the course and hence, a consortium is formed (Division of Electronic Engineering, SOE; Department of Physics, Department of Electronics and Department of Instrumentation).

Second year payment after students move to ETU is to be made to ETU LETI, Russia.

9.2 Operational Clause

The course will be coordinated by Division of Electronics Engineering, School of Engineering. Role of coordination can be done in rotation by collaborating departments if desired. It is suggested that the course be managed by a separate centre for all international courses. Departments in the consortium have agreed to share the teaching load as per the attached list (Annexure III). These subjects' teaching load should be added to the workload of respective department. Work load computation is as follows.

Semester 1

Sl No.	Course Code	Course Name	Credits	Academic Hours		
			CUSAT & ETU	Lec/week	Lab/week	No. of Lab Expts.
1	24-DEC1-3101	Foreign language / Russian as a foreign language	2	2		
2	24-DEC1-3102	Computer Technology and Simulation in Electronics	3	4	6	7
3	24-DEC1-3103	Problems of Modern Electronics	4	5		
4	24-DEC1-3104	Basics of Scientific Research	2	2		
5	24-DEC1-3105	Semiconductor Optoelectronic Devices	5	6		
6	24-DEC1-3106	Integrated and Fiber Optics	5	5	3	5
7	24-DEC1-3107	Academic Internship (Research Project (Acquiring Basic Research Skills))	9	2		
		TOTAL HOURS	30	26	9	

Semester 2

Sl No.	Course Code	Course Name	Credits	Academic Hours		
			ETU	Lec/week	Lab/week	No. of Lab Expts.
1	24-DEC1-3201	Foreign language / Russian as a foreign language	2	2		
2	24-DEC1-3202	Microprocessor Techniques	3	3	3	8
3	24-DEC1-3203	Micro- and nanotechnology processes	2	3	3	5
4	24-DEC1-3204	X-Ray Structural Methods of Material Research	3	3	3	8
5	24-DEC1-3205	Semiconductor Heterostructure Technology	3	3	3	3
6	24-DEC1-3206	Computer modeling and design of microwave and optical electronic devices	3	4	3	6
7	24-DEC1-3207X	Elective-I	2	2		
8	24-DEC1-3208	Internship (Research Project)	12			
		TOTAL HOURS		20	15	

9.3 Requirements

To ensure quality, the course has adapted the curriculum of ETU LETI. This treats the subjects in depth and vastness. The credit computation and number of contact hours for each subject are entirely different from what is being followed in CUSAT. It is the responsibility of CUSAT to mould the admitted students in such a way that, in second year, the students can easily adapt to classes offered in ETU LETI, Russia. More working hours are required to deliver the entire contents, hence **workload of each subject is computed based on contents and hours required to cover the subject rather than credits.**

Some teachers from the consortium departments are offered training which intends to bridge the gap of content delivery method of the two universities. This could be done in a regular basis so that more teachers become equipped to train the students. The requirements can be summarised as follows:

1. Required sanction may be obtained from UGC/AICTE, which is highly essential for retaining approval for all courses currently offered by departments involved.
2. Consider the workload of subjects handled by departments involved as the workload of respective departments. Workload to be calculated based on hours required rather than credits, which is the usual practice followed in CUSAT.
3. Sanction may be given to appoint contract faculty if needed so as to maintain the mandatory Student Faculty Ratio. SFR being a critical requirement for accreditation of existing courses. The additional workload borne by the departments involved should not jeopardise the existing courses.
4. Common guidelines can be set by a centre which can manage all courses offered through international collaboration. All departments in CUSAT, including the Department of foreign languages can collaborate with the centre for the smooth conduct of the course. Academic responsibility of the course can be taken by one of the departments in the consortium for each international course.
5. The curriculum gives thrust on seminars and group discussions for each subject. Some specialised topics will be delivered by ETU LETI in online mode. Hence, a dedicated classroom with internet and video conferencing facility is desired.
6. Lab facilities of all departments can be shared on remuneration basis if needed to ensure high quality of lab experience to the enrolled students.
7. If similar subjects are offered in any other department, the students enrolled to the course may be permitted to join the class.
8. Sanction be given to appoint guest lecturers, if needed. The topics of the course are highly specialised which requires highly qualified personnel or domain expert from industry. Special rates may be sanctioned for the guest as suggested in the fee computation sheet attached (Annexure II). The service of research scholars, specialising in the particular area can be availed. Such scholars may be given remuneration as guest faculty.

10. Assurance

The consortium will take responsibility to train the enrolled students to the high and expected level so that the students will not have any knowledge gap while they move to Russia in second year. Service of senior and experienced teachers may also be required for the same. Authorities need to assure that, this course and its special needs do not tamper the quality and existence of the current courses offered by any of the involved departments.

11. Requirement for the announcement of Dual Degree Masters Programme

An agreement as per Annexures III and IV has to be signed by both of the parties and is put forth for the consideration of the syndicate. The agreement (Annexure IV) is prepared as per the format of ETU LETI.